TRANSCRIPT OF RECORD

Supreme Court of the United States

OCTOBER TERM, 1950

No. 565

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., RCA-VICTOR DISTRIBUTING CORPORATION, ET AL., APPELLANTS,

vs.

THE UNITED STATES OF AMERICA, FEDERAL COMMUNICATIONS COMMISSION AND COLUMBIA BROADCASTING SYSTEM, INC.

APPEAL FROM THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF ILLINOIS

FILED FEBRUARY 19, 1951.

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INDEX

	Original	Print
Record from U. S. D. C., Northern District of Illinois	1	1
Captions (omitted in printing)	1	
Complaint	5	1
Exhibit "A"—Notice of further proposed rule making issued by Commission, July 11, 1949	29	16
Exhibit "B"—First report of Commission, September 1, 1950	107	95
Exhibit "C"—Second notice of further proposed rule making issued by Commission, September 1, 1950	291	288
Exhibit "D"—Pamphlet titled "Comments of Radio Corporation of America"	295	289
Exhibit "E"—Petition of R.C.A. for additional time in which the Commission might view improvements	437	408
Exhibit "F"—Order of Commission denying petition of R. C. A., October 10, 1950	439	410
Exhibit "G"—Second Report of Commission, October 11, 1950	443	413
Exhibit "H"—Order of Commission, October 10, 1950	469	432

JUDD & DETWEILER (INC.), PRINTERS, WASHINGTON, D. C., MAR. 6, 1951.

	Original	Print
Record from U. S. D. C., Northern District of Illinois—Continued		
Notice, filed October 24, 1950	475	435
Motion of plaintiffs for temporary injunction, filed October 24, 1950	476	435
Order entered by the Honorable J. Earl Major, Chief Judge, U. S. Court of Appeals for the Seventh Circuit	479	437
Defendants' motions to dismiss the complaint, or in the alternative for summary judgment, filed October 30, 1950	481	437
Affidavit of Benedict P. Cottone, filed October 30, 1950	483	439
Notice, filed November 14, 1950	493	448
Motion of Pilot Radio Corporation to intervene as a plaintiff, filed November 14, 1950	496	450
Intervening Complaint of Pilot Radio Corporation, filed November 14, 1950	501	451
Exhibit "A"—Order of Commission, October 10, 1950 (copy) (omitted in printing)	519	
Exhibit "B"—Second Report of Commission (copy) (omitted in printing)	523	
Exhibit "C"—First Report of Commission (copy) (omitted in printing)	539	
Exhibit "D"—Report of Commission, March 18, 1947	722	458
Exhibit "E"—Letter, Pilot Radio Corporation to Commission, September 27, 1950	736	475
Notice filed October 30, 1950	744	482
Motion of Columbia Broadcasting System, Inc., to intervene as defendant, filed October 30, 1950	746	483
Affidavit of Adrian Murphy, filed October 30, 1950	748	484
Stipulation re intervention of Columbia Broadcasting System	751	486
Notice filed October 30, 1950	755	488
Motion of Columbia Broadcasting System, Inc., to dismiss the complaint or in the alternative, for summary judgment, filed October 30, 1950	757	490
Notice filed November 10, 1950	762	492
Motion to intervene of Wells-Gardner & Co., filed November 10, 1950	765	493
Intervening complaint of Wells-Gardner & Co., filed November 14, 1950	769	495
Notice filed November 10, 1950	781	502
Motion of Television Installation Service Association, to intervene, filed November 10, 1950	783	503
Intervening complaint of Television Installation Service Association	785	504
Subpoena Duces Tecum Re Federal Communications Commission	799	515
Subpoena Duces Tecum Re Columbia Broadcasting System, Inc.	801	516
Notice filed November 10, 1950	804	518

Record from U. S. D. C., Northern District of Illinois—Continued	Original	Print
Petition to intervene of Sightmaster Corp., filed November 10, 1950	806	519
Intervening Complaint of Sightmaster Corp., filed November 14, 1950	810	520
Notice filed November 10, 1950	819	526
Motion of The Radio Craftsmen Incorporated to intervene, filed November 10, 1950	822	528
Intervening complaint of The Radio Craftsmen Incorporated, filed November 14, 1950	826	529
Notice filed November 14, 1950	836	535
Motion of Emerson Radio & Phonograph Corp. to intervene, filed November 14, 1950	838	536
Pleading of Emerson Radio & Phonograph Corp. in intervention, filed November 14, 1950	840	538
Notice filed November 14, 1950	849	544
Motion of Local 1031, International Brotherhood of Electrical Workers, AFL, to intervene, filed November 14, 1950	851	545
Intervening complaint of Local 1031, International Brotherhood of Electrical Workers, AFL, filed November 14, 1950	854	548
Affidavits of Plaintiffs, filed November 9, 1950	863	555
a. Affidavit of C. B. Jolliffe	867	555
b. Affidavit of Walter A. Buck	927	597
c. Affidavit of John H. MacDonald	943	606
d. Affidavit of Walter M. Norton	959	612
Supplementary affidavit of Walter M. Norton, with exhibits attached, filed November 9, 1950	966	615
Affidavit of Samuel I. Rosenman, filed November 13, 1950	1014	663
Affidavit of Frank Stanton, with Exhibits attached, filed November 13, 1950	1017	665
Affidavit of Herbert V. Akerberg, filed November 13, 1950	1071	703
Affidavit of Oscar Katz, with Exhibits attached, filed November 13, 1950	1076	707
Affidavit of Earl W. Muntz, with Exhibit attached, filed November 13, 1950	1149	751
Response to subpoena duces tecum and motion to quash, filed February 14, 1951, nunc pro tunc, November 13, 1950	1153	753
Affidavit of Max Goldman, with attached exhibits, filed February 14, 1951, nunc pro tunc, November 13, 1950	1158	755
Correspondence concerning color television between Senator Edwin C. Johnson and The Federal Communications Commission or individual members of The Federal Communications Commission, filed November 14, 1950 (omitted in printing)	1172	

	Original	Print
Record from U. S. D. C., Northern District of Illinois—Continued		
Exhibits CBS (similar correspondence between Senator Johnson and Columbia Broadcasting System, Inc.) (omitted in printing)	1266	
Affidavit of George H. Brown, filed February 14, 1951, nunc pro tunc, November 14, 1950	1421	765
Affidavit of Milton Chasin, filed February 14, 1951, nunc pro tunc, November 14, 1950	1424	766
Affidavit of Harry Lefkowitz, filed February 14, 1951, nunc pro tunc, November 14, 1950	1426	768
Affidavit of William Blank, filed February 14, 1951, nunc pro tunc, November 14, 1950	1428	769
Affidavit of Frank Perloff, filed February 14, 1951, nunc pro tunc, November 14, 1950	1430	770
Affidavit of J. O. Reinecke, filed November 13, 1950	1433	772
Affidavit of Richard L. Hirsch, filed November 13, 1950	1441	777
Affidavit of Harold V. Levin, filed November 13, 1950	1453	789
Order entered on October 30, 1950, granting leave to intervene—C.B.S., Inc.	1455	789
Orders entered November 14, 1950, granting leave to intervene—Wells-Gardner & Co., et al.	1458	790
Temporary restraining order and findings of fact and conclusions of law, entered November 16, 1950	1466	792
Affidavit of Isidor Goldberg, and attachments thereto, filed November 20, 1950	1473	797
Transcript of proceedings. Had on November 14, 15, 16, 1950, before the District Court, filed January 5, 1951 (omitted in printing)	1524	
Brief for motion for temporary injunction and against motions to dismiss or for summary judgment, submitted and received on November 13, 1950 (omitted in printing)	1904	
Defendants brief, submitted and received November 13, 1950 (omitted in printing)	1985	
Memorandum in response to motion of Emerson Radio & Phonograph Corp., to intervene, submitted and received November 14, 1950 (omitted in printing)	2068	
Memorandum on behalf of Emerson Radio & Phonograph Corp., submitted and received November 15, 1950 (omitted in printing)	2074	
Memorandum of Columbia Broadcasting System, Inc., concerning subpoenas served by Pilot Radio Corp., submitted and received November 15, 1950 (omitted in printing)	2093	
Memorandum of Pilot Radio Corp., intervening as a party-plaintiff, submitted and received November 20, 1950 (omitted in printing)	2099	
Memorandum of Columbia Broadcasting System, Inc., defendant-intervenor, submitted and received November 21, 1950 (omitted in printing)	2135	

	Original	Print
Record from U. S. D. C., Northern District of Illinois—Continued		
Reply brief of defendants, submitted and received November 24, 1950 (omitted in printing)	2209	
Plaintiffs' reply brief, submitted and received November 28, 1950 (omitted in printing)	2223	
Reply memorandum of Emerson Radio & Phonograph Corp., applicant to intervene as plaintiff-intervenor, submitted and received December 6, 1950 (omitted in printing)	2299	
Opinion of the District Court, Major, J., filed December 22, 1950	2308	863
Dissenting opinion, LaBuy, J.	2322	879
Order of the District Court, entered December 22, 1950	2326	882
Order of the District Court, entered January 23, 1951	2328	883
Plaintiffs' petition for appeal, filed January 25, 1951	2330	884
Appeal bond, filed January 25, 1951 (omitted in printing)	2335	
Assignment of errors and prayer for reversal, filed January 25, 1951	2339	886
Order allowing appeal, entered January 25, 1951	2411	892
Order of Court for transmission of original documents, entered January 25, 1951	2419	893
Citation on appeal, filed January 25, 1951 (omitted in printing)	2421	
Admission of service of papers on appeal, filed January 25, 1951	2424	894
Praecipe, filed January 25, 1951	2426	896
Plaintiffs' supplement to praecipe, filed February 7, 1951	2460	900
Order of the District Court, entered February 14, 1951 Re: Filing of Certain Documents nunc pro tunc	2464	902
Order of the District Court, correcting typographical error in the motion to affirm, entered February 14, 1951	2465	903
Docket entries	2466	905
Clerk's certificate (omitted in printing)	2475	
Statement of points to be relied upon and stipulation designating parts of the record to be printed	2476	913
Order noting probable jurisdiction and assigning cause for argument, etc.	2483	916

[fols. 1-4] [Captions omitted]

[fol. 5]

IN THE UNITED STATES DISTRICT COURT, NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC.

and

RCA VICTOR DISTRIBUTING CORPORATION, Plaintiffs,

against

UNITED STATES OF AMERICA and FEDERAL COMMUNICATIONS COMMISSION, Defendants

Equitable Relief Sought

Civil Action No. 50C1459

COMPLAINT—Filed October 17, 1950

Plaintiffs, for their complaint herein, allege:

Jurisdiction

1. Plaintiffs, above named, bring this action pursuant to the provisions of the Communications Act of 1934, as amended (48 Stat. 1064, 1093 and 63 Stat. 108; 47 U. S. C. Section 402 (a)) and of Title 28 United States Code (28 U. S. C. Sections 1336, 1398, 2284, 2321-25) and Section 10 of the Administrative Procedure Act (60 Stat. 243; 5 U. S. C. Section 1009), to enjoin, set aside, annul and suspend an [fol. 6] order of the Federal Communications Commission (hereinafter called the "Commission") adopted October 10, 1950 in proceedings entitled "In the Matters of Amendment of Section 3.606 of the Commission's Rules and Regulations (Docket Numbers 8736 and 8975), Amendment of the Commission's Rules, Regulations and Engineering Standards concerning the Television Broadcast Service (Docket Number 9175) and Utilization of Frequencies in the Band 470 to 890 Mcs. for Television Broadcasting (Docket Number 8976)", (the order being hereinafter called the "Order"). The effective date of the Order is November 20, 1950.

The Parties

2. Plaintiff Radio Corporation of America (hereinafter called "RCA"), is a corporation duly organized and existing under the laws of the State of Delaware, and resides in the Northern District of Illinois, Eastern Division, being qualified to do business and doing business in said District and Division.

3. Plaintiff, National Broadcasting Company, Inc. (hereinafter called "NBC"), is a corporation duly organized and existing under the laws of the State of Delaware, and resides in the Northern District of Illinois, Eastern Division, being qualified to do business and doing business in said District and Division. NBC is a wholly owned subsidary of RCA.

4. Plaintiff, RCA Victor Distributing Corporation (hereinafter called the "Distributing Corporation") is a corporation duly organized and existing under the laws of the [fol. 7] State of Illinois, and resides in the Northern District of Illinois, Eastern Division, having its principal office at 666 North Lake Shore Drive, Chicago, Illinois. The Distributing Corporation is a wholly owned subsidiary of RCA.

5. The Commission is an administrative tribunal created by said Communications Act of 1934 and is charged with the execution and enforcement of said Act.

6. The United States of America is made a defendant in this suit pursuant to the provisions of the Act of June 25, 1948 (62 Stat. 969; 28 U. S. C. Section 2322), and said Communications Act of 1934 (48 Stat. 1064, 1093, and 63 Stat. 108; 47 U. S. C. Section 402(a)).

The Industry Affected

7. RCA is engaged, among other things, in research and development work in the field of electronics and particularly in the field of radio and television, and in the manufacture and sale of radio and television transmitting and receiving apparatus and tubes.

8. NBC is engaged in sound and television broadcasting and in sound and television network broadcasting in interstate and foreign commerce.

9. The Distributing Corporation is engaged in the sale of television receivers and other products manufactured by the RCA Victor Division, the manufacturing division

of RCA, to dealers located in Chicago and other midwestern cities.

[fol. 8] 10. Since the 1920's RCA has been engaged in television research and development work, both with respect to black and white television and with respect to color television.

11. RCA and NBC have a present investment in television of approximately $100,000,000.

12. The Commission established commercial standards covering the transmission and reception of black and white television programs in 1941.

13. As a result of World War II the commercial development of television on any substantial scale was delayed until the fall of 1946, when the commercial sale of television home receivers began.

14. Since the fall of 1946 RCA has manufactured and sold to the public over a million and a half television home receivers. The television receiving set industry has manufactured and sold an estimated total of more than 8,000,000 black and white television home receivers.

15. These 8,000,000 television receivers represent an estimated audience of over 30,000,000 people and an estimated investment on the part of the public of over two billion dollars.

16. There is a reciprocal relationship between the number of television receivers in the hands of the public (the television audience) and the service which the television broadcaster is able to render to the public. The broadcasting of television programs is supported by the sale of time to advertisers, and the value of such time (and the revenue [fol. 9] derived from the sale of such time) is dependent primarily upon the size of the audience which may be reached by the broadcaster.

17. At the outset of the commercial development of television in 1946 the number of receivers outstanding was insufficient to maintain the schedule of NBC television programs, except at a substantial financial loss. The schedule of television programs maintained by NBC at that time resulted in substantial financial loss. As the number of receivers increased, NBC's revenues increased, and NBC and other broadcasters were enabled to improve and expand their television broadcast service.

18. Since the fall of 1946 the number of television re-

ceiving sets in the hands of the public has steadily and rapdily increased. On January 1, 1947, an estimated 15,000 television receiving sets were in the hands of the public. On January 1, 1948, the number is estimated at 200,000; on January 1, 1949, at 1,000,000; on January 1, 1950, at 4,000,000; and as of October 1, 1950 it is estimated that more than 8,000,000 black and white television receiving sets were in the hands of the public.

19. As a result of this steady and rapid increase in the number of television receivers in the hands of the public there is now the prospect of a television audience sufficient to permit the broadcasting of television programs without financial loss.

20. NBC owns and, pursuant to licenses granted by the Commission, operates five television broadcast stations. In addition, NBC furnishes television network program service to 58 television broadcast stations. The television [fol. 10] broadcast operations of NBC represent an investment of more than $8,000,000. More than 2,400 employees of NBC are engaged in television broadcast activities, and NBC estimates that its television broadcast activities provide employment to more than 3,700 people who are not employees of NBC.

21. The real estate, plants and equipment owned by RCA and devoted to the manufacture of television transmitting and receiving apparatus and tubes represent an investment of more than $35,000,000. More than 28,000 employees of RCA are engaged in the manufacture, service and sale of television transmitting and receiving apparatus and tubes. RCA's gross sales of television transmitting and receiving apparatus and tubes is at the annual rate of over $400,000,000.

22. The total present investment of the television manufacturing industry is estimated at not less than $300,000,000. Its total annual gross sales are estimated at $1,500,000,000. The total investment of the television broadcasting industry is estimated at $50,000,000. Its total annual gross income from television operations is estimated at $325,000,000.

Existing Black and White Television Standards

23. Commercial television broadcasting in the United States is carried on under technical transmission standards which were established by the Commission in 1941 after

extensive hearings. Until the promulgation of the Order complained of, the technical television transmission standards (the Commission's "Rules, Regulations and Engineer-
[fol. 11] ing Standards Concerning the Television Broadcast Service") contemplated commercial television broadcasting in black and white only and provided for commercial television broadcasting in 12 channels each of which is 6 megacycles wide.

24. The technical standards set by the Commission are of great importance in determining the quality of the television broadcast service available to the public, for those standards set the upper limits of performance which may be achieved by television transmitting and receiving apparatus. The present black and white television system has met with widespread public acceptance. The high quality of the present television service has been a large factor in the success of the television industry described above.

25. The black and white television transmission standards provide for the broadcasting of a television picture which has 525 lines and 60 fields per second. The present black and white standards are such that the picture which appears on the face of the television receiver is comprised of approximately 200,000 picture elements. It is this large number of picture elements which accounts for the high degree of picture detail and the consequent picture quality produced.

26. The television transmitting and receiving equipment manufactured and sold by RCA and others has been designed in accordance with these standards. This equipment has been carefully designed in order to give to the public the best possible television service at the lowest possible cost.

[fol. 12] 27. The public acceptance of television based upon these standards has been unequalled in the history of any other industry or public service.

28. The enormous and rapidly increasing sale of television receivers would not have been possible without the concurrent initiation, development and growth of a television broadcast service which, in turn, has also depended upon the sale of receivers described above.

29. The initiation, development and growth of the television broadcasting and receiving industry would not have been possible were the standards set by the Commission

not of high quality and were they not adopted with the express view to protecting the public against obsolescence.

30. It is on this foundation that the entire television industry rests. The quality of the present service, the improvements and reductions in price to the public that have been made, the incredible expansion of the industry as a whole, are all due to the fact that manufacturers could build upon a single set of long-range high-quality standards.

This single set of long-range, high-quality standards has been arbitrarily and capriciously upset by the Order of the Commission herein complained of.

Proposed Color Television Systems

31. On July 11, 1949 the Commission issued a document entitled "Notice of Further Proposed Rule Making (FCC 49-948)" in the above described proceedings. A copy of [fol. 13] this Notice is attached hereto as Exhibit A and made a part hereof.

32. In this Notice the Commission proposed, among other things, to consider color television systems, provided that such color systems met two criteria: first, that they operate in a 6-megacycle channel and second, that the pictures could be received on existing television receivers "simply by making relatively minor modifications in such existing receivers."

33. Pursuant to this Notice and the various amendments thereto, a hearing was held before the Commission *en banc* commencing September 26, 1949 and continuing intermittently until May 26, 1950.

34. During the course of these hearings evidence was presented to the Commission with respect to three proposed color television systems, all of which can operate in a 6-megacycle channel. The three color systems were those proposed by RCA, by Color Television Incorporated and by Columbia Broadcasting System, Inc. (hereinafter called "CBS").

35. RCA presented evidence with respect to its all-electronic, high-definition color television system, which is completely compatible. Compatibility means that the color television transmissions of the system can be received as a black and white picture on an existing black and white

receiver without making any changes in the receiver whatever.

36. In addition, the color transmissions of the RCA system can be received on existing receivers as a black [fol. 14] and white picture without any degradation of the quality of the picture as compared with a standard black and white picture.

37. Color Television Incorporated also presented evidence with respect to an all-electronic and theoretically compatible system.

38. CBS presented evidence with respect to its color television system, which is wholly incompatible. This means that nothing whatsoever can be received by any of the existing 8,000,000 black and white receivers from broadcasts of the CBS color system.

39. Even after extensive and expensive adaptation, the only picture which can be received on existing receivers from CBS system transmissions is a degraded black and white picture. Instead of having 525 lines and 60 fields per second, as does the present black and white system, the CBS system has only 405 lines and 144 fields per second. The picture which appears on the face of the television receiver in the CBS system is comprised of only 83,000 picture elements as contrasted with the 200,000 picture elements of the standard black and white picture. This is a serious decrease in picture detail and picture quality.

40. The CBS system was designed for use with a spinning mechanical disc, which it still uses. The maximum direct view color picture which can be produced with a mechanical disc receiver is a 12½" picture. Over 99% of the television sets in the hands of the public are direct view receivers. Approximately 90% of the receivers sold at the present time are sets with a picture of 16 inches or larger.

[fol. 15] 41. After the adaptation above referred to, by purchasing and installing an additional expensive device called a converter it is possible for some existing receivers to obtain CBS transmissions in color. However, when this device is used there is a loss of picture size if the picture tube is larger than 12½ inches. This converter consists primarily of the spinning mechanical disc and its housing. Whenever a black and white program is on the air this converter has to be removed, to be replaced again when a color transmission is to be received.

The Commission's First Report

42. On September 1, 1950, the Commission issued a document in these proceedings entitled "First Report of Commission (Color Television Issues)", a copy of which is annexed hereto as Exhibit B and made a part hereof, together with its "Second Notice of Further Proposed Rule Making", a copy of which is annexed hereto as Exhibit C and made a part hereof.

43. In this Report the Commission did not adopt any of the proposed color television systems. The Report concluded instead that the Commission should allow more time for the development of all color systems. The Commission, however, conditioned the allowance of this additional time upon the acceptance by the industry of two arbitrary conditions.

44. Although the Commission has no jurisdiction over television set manufacturers, the Commission sought to require that such manufacturers agree with the Commission to build all their black and white television receivers according to specifications laid down by the Commission. [fol. 16] These specifications required extensive alterations in present production model receivers.

45. The Commission stated to the television set manufacturers that if they did not agree so to build their sets the Commission would forthwith and finally adopt the CBS color system.

46. To implement its arbitrary conditions the Commission proposed the adoption of so-called bracket standards. These would permit the broadcasting and reception of black and white television of either 525 lines, 60 fields per second, or 405 lines, 144 fields per second, or any other combination of lines and fields within widely separated limits.

47. The Commission's notice instituting this hearing made no mention of bracket standards. As one Commissioner stated: "The subject of bracket standards was not at issue in the hearing nor was the subject even advanced during the hearing. * * * the subject of bracket standards was a new concept in field and line scanning proposed after the hearing record closed. It came as a surprise to industry and was not based upon information appearing in the record of this proceeding."

48. The other arbitrary condition required by the Com-

mission was acquiescence by the industry in this drastic change, without a hearing, in the black and white standards which had been in effect since 1941.

49. The additional complexity of bracket standards receivers, at the rate of production which existed before the issuance of the Order complained of, would have resulted [fol. 17] in an increased cost to the public for television receivers of hundreds of millions of dollars each year. These hundreds of millions would not have provided color pictures but would only have provided for variations in the standards of black and white transmissions.

50. These hundreds of millions of dollars each year would be spent by the public in order to provide a degraded compatibility for the CBS system in the event the Commission decided, after obtaining further information with respect to all of the systems proposed, to adopt the CBS system. In addition, this degraded compatibility could be obtained only on future receivers.

51. The Commission's First Report shows that the Commission was not satisfied with the CBS system. There are many instances in which the Commission stated that it desired more information with respect to defects of the CBS system and the Commission's description of the CBS system is in terms of adequacy rather than in terms of high-quality performance. Yet the Commission's Report threatened to adopt the CBS system on what the Commission itself characterized as "speculation and hope", unless the television manufacturing industry would accept dictation by the Commission as to the kind of receiver which it must build in the future.

52. With minor exceptions, those of the television manufacturing industry who submitted comments with respect to said Second Notice stated that to change their production of black and white receivers so as to accept the proposed standards was impractical, unnecessarily costly to the public, and could not be done in accordance with the time schedule set forth in the Second Notice. A copy of [fol. 18] the RCA Comments with respect to the Second Notice is annexed hereto as Exhibit D and made a part hereof.

53. These comments pointed out the facts that the Commission's proposal to adopt the CBS system was based on scientifically incorrect conclusions, was at variance with the evidence submitted at the hearings, and was contrary

to the public interest, convenience and necessity. In addition, the comments directed the Commission's attention to certain readily available information of controlling significance which the Commission failed to consider although it had the duty to do so before reaching a final decision. This is particularly true in view of the fact that the Commission's Report showed that it did not understand various aspects of the RCA system.

The RCA Petition

54. On October 4, 1950, RCA filed a Petition with the Commission asking for additional time in which the Commission might view the improvements in performance of the RCA color system, without insisting upon the two limiting arbitrary conditions hereinabove referred to. A copy of this Petition is annexed hereto as Exhibit E and made a part hereof.

55. On October 10, 1950 the Commission denied the RCA Petition and issued the Second Report of the Commission. A copy of the Order denying the Petition is annexed hereto as Exhibit F and made a part hereof, and a copy of the Second Report is annexed hereto as Exhibit G and made a part hereof. The Second Report reserved the question of bracket standards for future hearing.

[fol. 19] 56. In its Second Report the Commission reaffirmed its First Report, and concluded, without looking at them, that no improvement in existing systems warranted a reopening of the record.

The Order of the Commission

57. Without further hearings, and pursuant to its First and Second Reports, the Commission on October 10, 1950 issued its Order effective November 20, 1950 adopting the incompatible CBS color television system for the commercial broadcasting of color television. A copy of the Order is annexed hereto as Exhibit H and made a part hereof.

58. The effect of the Order will be that all existing television receivers will be unable to receive a part of the television broadcasting service. Programs transmitted pursuant to the standards promulgated by the Order will not be receivable on existing sets even as black and white programs unless the sets are extensively modified at considerable cost, and even then the black and white picture

produced by the CBS standards will be degraded in quality.

59. Programs transmitted pursuant to the CBS standards will not be receivable on existing sets as color programs unless the sets are even more extensively modified at greater cost, and in many instances the modifications proposed are impractical.

60. New sets designed to receive the CBS standards, as well as existing standards, in black and white, will take time to produce and will be substantially more expensive than existing sets.

[fol. 20] 61. New sets designed to receive the CBS standards in color will also take time to produce and will be even more expensive.

62. The broadcaster of television programs will have virtually no audience at all for programs transmitted in accordance with the CBS standards, neither a black and white audience nor a color audience, for a considerable period of time, if ever.

63. To the extent that programs are broadcast pursuant to the CBS standards, existing television set owners will be deprived of a part of the television broadcast service, in reliance on which they purchased their sets.

64. The broadcasting of television programs on the CBS standards will deprive broadcasters of the television audience that has been gradually built up over a period of four years, to the irreparable injury of the television broadcast service, and will deprive the existing television audience of a part of the television broadcast service, to the irreparable injury of the public interest.

65. The reciprocal relationship between the television receivers in the hands of the public and the service which the television broadcaster is able to render to the public, upon which the entire television industry depends, will be upset as a result of the Order. The broadcaster will be unable to count upon the audience which he has thus far been entitled to expect, and the television set owner will be unable to count on the continuance of the television broadcast service which he has been led to believe he would receive.

[fol. 21] 66. The effect of the Order will be to impair the existing market acceptance of the present black and white television receivers, to the irreparable injury of the television receiver manufacturing and distributing industry.

67. The effect of the Order is to authorize the commer-

cial broadcasting of color programs upon CBS standards to the exclusion of the commercial broadcasting of color programs on any other color television standards. Thus, commercial broadcasting in accordance with the RCA system is prohibited, although it, unlike the CBS system, is compatible and can be received on existing receivers without modification and without degradation of picture quality, and can be broadcast by all television broadcasters without dilution of their audience.

68. The public's loss of television service and the broadcaster's loss of television audience because of the incompatibility of the CBS system cannot be solved by simultaneous transmissions on color and on black and white standards. This would require that every broadcaster use two broadcasting channels rather than one. The demands of the various radio services for channel space in the radio frequency spectrum are so great as to prevent such duplicate transmissions.

69. Ten years having elapsed since the adoption of commercial television standards during which the public has invested approximately two billion dollars in television receivers, the Commission cannot consistently with its obligation to protect the public interest adopt a color system which is incompatible with the black and white system on which more than 30,000,000 of the public depend for their television service.

[fol. 22] *The Order Cannot Be Sustained*

70. The Commission's staff engineer who took the most active role throughout the hearing on behalf of the Commission's technical staff and who is in charge of the Commission's laboratory which tested the various color systems invented a device usable only in the CBS system and applied for a patent thereon.

71. On disclosure of this fact objection by RCA was overruled and the staff engineer continued in the proceedings as theretofore.

72. On information and belief the Commission relied on this staff engineer's advice because the majority of the Commission have no engineering training and the decision of the Commission is stated to be based entirely upon engineering considerations.

73. Although the engineer foreswore any financial interest in his device he did have professional prestige and

reputation at stake which could be furthered only if the CBS system were adopted.

74. On information and belief he advised the Commission in the absence of the parties and participated in the formulation and preparation of its Reports and the Order herein complained of.

75. The Commission's Order is illegal, void and beyond the power, authority and jurisdiction of the Commission for the following reasons:

(a) The Order is contrary to the public interest, convenience and necessity, the basic statutory standard contained in the Communications Act of 1934.

[fol. 23] (b) The Order violates Section 303(g) of the Communications Act of 1934.

(c) The Order is unsupported by substantial evidence, is arbitrary and capricious, and is an abuse of discretion.

(d) The Order was adopted before the Commission had discharged its statutory duty to inform itself adequately before issuing a final order in a rule-making proceeding. The Commission wrongfully refused to consider additional evidence of determinative significance to its decision and wrongfully denied the RCA Petition.

(e) The Order is based upon the rejection by the television industry of the two illegal conditions set forth in the First Report.

(f) The Order is contrary to the terms of the Commission's Notice of July 11, 1949, pursuant to which the hearings on which the Order purports to be based were held.

(g) On the facts disclosed, the staff engineer should not have been permitted to continue in the proceeding.

(h) The Order deprives the plaintiffs of property without due process of law, contrary to the Fifth Amendment to the Constitution of the United States.

[fol. 24] *Plaintiffs Will Be Irreparably Injured by the Order*

76. The Order complained of will irreparably injure RCA's television manufacturing business by decreasing the sale of television receivers. The promulgation of this order, involving an abrupt departure from the long range stand-

ards adopted in 1941, jeopardizes the long term enjoyment of a television set purchased today. The uncertainty thus engendered is heightened by the overhanging threat of a still further change in standards. This threat is real because of the Commission's statement that it will hold a hearing on the possible adoption of bracket standards on a basis that no one can predict.

77. Doctor Frank Stanton, President of CBS, on October 15, 1950, went on the air over that network to discourage people from buying present models of television receivers.

78. RCA is now in the process of manufacturing and marketing present black and white receivers which will have an aggregate retail market value of more than $10,000,000 when completed. In addition, RCA has an inventory and has contracted for the purchase of parts and components for such black and white receivers in the aggregate amount of $55,000,000. The demoralization of the market resulting from the Order will seriously impair RCA's opportunities for selling these receivers.

79. The Distributing Corporation has a present inventory of television receivers costing approximately $1,000,000, with respect to which it does not have firm sales contracts. The effect of the Order will to be to injure the [fol. 25] Distributing Corporation in the sale of this inventory and will otherwise damage its business of selling black and white television receivers.

80. NBC has a present investment of more than $8,000,000 in its television network facilities and television stations. While this investment was made in the hope of eventually earning a profit on these activities, it was recognized that earnings could not be achieved in the early years when there were insufficient receivers in the hands of the public. As a result, NBC has suffered a cumulative loss of many millions of dollars from its television broadcasting and programming operations to date, and was just beginning to reach a point where some of these losses could be recouped when the Commission announced its Order of October 10, 1950 on color television. The effect of the Order will be either substantially to dilute the television audience, on the reasonable expectation of which NBC has made substantial financial investments and commitments, or to require NBC to commence incompatible color broadcasting to a virtually non-existent color audience, or both, each

of which will irreparably injure NBC's television broadcasting business.

81. RCA has a large investment in the development of its compatible color television system. The Order adopting the incompatible CBS color system impairs the advantages of compatibility now possessed by the RCA system. If the Order standardizing upon the CBS color system remains in effect and receivers capable of operating on those standards are sold, the existence of those receivers in the hands of the public will operate as a deterrent to the adoption of the RCA system by the Commission at some future date. Unless the RCA system is authorized as a broadcast service, [fol. 26] RCA's investment in its color system will be substantially impaired.

82. The adoption of the incompatible CBS color television system will impede the future growth of the television industry upon which RCA and NBC, with all other television manufacturers and broadcasters, depend. It will as well imperil the employment not only of the more than 30,000 people RCA and NBC employ in television manufacture, but also the hundreds of thousands employed throughout the television industry.

83. The plaintiffs have no adequate remedy at law.

Wherefore, plaintiffs pray:

1. That this Court, as soon as practicable, convene a specially constituted court of three judges, as required by Title 28, United States Code (28 U. S. C. Sections 2284, 2325), and that a temporary or interlocutory injunction be entered herein restraining, enjoining and suspending until the further order of this Court the promulgation, operation, and execution of the Order.

2. That, after final hearing, this Court adjudge, order and decree that the Order is, and has at all times been, beyond the lawful authority of the Commission, in violation of the legal rights of plaintiffs, and is wholly void, arbitrary and unreasonable, and that the Order be perpetually vacated, set aside, suspended and annulled, and the promulgation, operation and execution thereof perpetually restrained and enjoined.

[fol. 27] 3. That plaintiffs may have such other and further relief in the premises as to equity and justice may ap-

pertain and as may be deemed by this Court to be adequate and proper under the circumstances.

Weymouth Kirkland & Kirkland, Fleming, Green, Martin & Ellis. By Weymouth Kirkland, A member of the Firm, Attorneys for Plaintiffs, Office and P. O. Address, 33 N. LaSalle Street, Chicago, Illinois.

Of Counsel: Cahill, Gordon, Zachry & Reindel, New York City. John T. Cahill, Joseph V. Heffernan, John W. Nields.

[Verification Follows]

[fol. 28] *Duly sworn to by Frank M. Folsom. Jurat omitted in printing.*

[fol. 29] EXHIBIT "A" TO COMPLAINT

FEDERAL COMMUNICATIONS COMMISSION

Washington 25, D. C.

Mimeo #37460 FCC 49-948

In the Matters of

Docket Nos. 8736 and 8975

Amendment of Section 3.606 of the Commission's Rules and Regulations

Docket No. 9175

Amendment of the Commission's Rules, Regulations and Engineering Standards concerning the Television Broadcast Service

Docket No. 8976

Utilization of Frequencies in the Band 470 to 890 Mcs. for Television Broadcasting

Notice of Further Proposed Rule Making

1. Notice is hereby given of further proposed rule making in the above-entitled matters. For purposes of identifica-

tion, the prior proceeding in the above-entitled matters shall be designated as "Part I" of these proceedings. The proceedings instituted by this notice shall be designated as "Part II" of these proceedings. The above-entitled proceedings are hereby consolidated, and the records therein are hereby reopened.

2. The caption of the proceedings in Docket No. 9175 is hereby amended to read as set forth above, and to eliminate the former reference to the FM Broadcast Service. The Commission is making no proposal at this time concerning the FM broadcast rules, regulations, or standards, and will consider no proposals on this subject from other persons in the above-entitled proceedings. If the evidence taken in this proceeding, heretofore, or hereafter, should warrant a proposal for the amendment of the rules, regulations and standards concerning FM broadcast service, the Commission will institute a separate proceeding for that purpose.

3. The Commission's proposals for amendment of Section 3.606 of its Rules and Regulations containing the table of allocation of television channels set forth in the following notices heretofore issued in Docket Nos. 8736 and 8975, *are hereby withdrawn:*

(a) Notice of Proposed Rule Making (FCC 48-126) released January 20, 1948.

(b) Notice of Proposed Rule Making (FCC 48-1569) released May 6, 1948.

(c) Supplemental Notice of Proposed Rule Making (FCC 48-1812) released July 16, 1948.

[fol. 30] 4. In view of the withdrawal of the Commission's proposals in the above notices, all interested persons who have heretofore participated in the above-entitled proceedings, may participate further only by complying with the procedures set forth in paragraphs 14 and 15 hereof. Persons who have indicated their interest in allocation of television channels to specific areas (by petition, letter, or application heretofore filed with the Commission) may participate in this proceeding only by complying with the procedures set forth in said paragraphs.

5. The Commission proposes to amend Parts 2 and 3 of its Rules and Regulations ("Rules Governing Television Broadcast Stations") and its "Standards of Good Engineering Practice Concerning Television Broadcast Sta-

tions" as set forth in *Appendices A, B, C and D* attached hereto.

6. It is evident that an understanding must be reached between the United States of America and Canada, Mexico and Cuba with respect to the allocation of television channels along their mutual borders. Such an understanding is necessary in order to prevent undue interference between television stations in the respective countries and in order to provide for a fair, efficient and equitable allocation of television channels between the United States and the above countries. Accordingly, in Appendix D herein, the Commission has included certain assignments for Canada, Mexico and Cuba which might be allocated on the same basis of the overall proposal if the borders between the countries did not exist. No formal agreements have been made and these potential assignments for Canada, Mexico and Cuba are included in the proposal only for illustrative purposes and to show the effect on the above "Table" of a reasonable number of assignments to Canada, Mexico and Cuba. The Commission proposes to recommend that the State Department request the Canadian, Mexican and Cuban Governments to enter into formal agreements as soon as possible.

7. In preparing the "Table" of television channel allocations set forth in Appendix C attached hereto, the Commission has not altered existing television authorizations except in three instances. These exceptions resulted from the Commission's efforts to arrive at an equitable allocation of television channels between the United States and the Dominion of Canada. The three cities so affected are Cleveland, Ohio, Syracuse, New York and Rochester, New York. The changes proposed by the Commission with respect to these cities and the basis for its proposals are set forth in the following paragraphs.

8. In the existing "Table" of television allocations set forth in Section 3.606 of the Commission's Rules and Regulations, Channels 5, 8 and 10 are allocated to Syracuse, New York. A construction permit to operate on Channel 5 in Syracuse is held by the Central New York Broadcasting Co. (WSYR-TV). In the proposed "Table" in Appendix C attached hereto the Commission proposes to delete Channel 5 from Syracuse and substitute Channel 3 in its place. Should this proposal be adopted by the Commission, it is hereby proposed to modify the construction permit

held by Central New York Broadcasting Company for tele-
[fol. 31] vision station WSYR-TV in Syracuse by substituting therein Channel 3 in place of Channel 5. In the light of the information set forth in paragraph "7" above, it is the judgment of the Commission that its actions will result in the maximum utilization of television channels in the United States and Canada, and will promote the public interest, convenience and necessity, and the provisions of the Communications Act of 1934, as amended. *Accordingly*, pursuant to the provisions of Sections 303(f) and 312(b) of the Communications Act of 1934, as amended, Central New York Broadcasting Co. (WSYR-TV), Syracuse, New York, is directed to *Show Cause* in these proceedings and in accordance with the procedures set forth in paragraphs 14 and 15 herein, why its construction permit should not be modified accordingly in the event the Commission deletes Channel 5 from Syracuse and substitutes Channel 3 in its place.

9. In the existing "Table" of television allocations set forth in Section 3.606 of the Commission's rules, Channels 2, 6 and 11 are allocated to Rochester, New York. A construction permit to operate on Channel 6 in Rochester is held by the Stromberg-Carlson Co. (WHTM). In the proposed "Table" in Appendix C attached hereto the Commission proposes to delete Channels 2, 6 and 11 from Rochester and substitute Channels 5, 22, 32 and 44 in their places. Should this proposal be adopted by the Commission, it is hereby proposed to modify the construction permit held by Stromberg-Carlson Co., for television station WHTM, Rochester, New York, by substituting therein Channel 5 in place of Channel 6. In the light of the information set forth in paragraph "7" above, it is the judgment of the Commission that its actions will result in the maximum utilization of television channels in the United States and Canada, and will promote the public interest, convenience, and necessity, and the provisions of the Communications Act of 1934, as amended. *Accordingly*, pursuant to the provisions of Section 303(f) and 312(b) of the Communications Act of 1934, as amended, Stromberg-Carlson Co. (WHTM), Rochester, New York, is directed to *Show Cause* in these proceedings and in accordance with the procedures set forth in paragraphs 14 and 15 herein, why its construction permit should not be modified accordingly in the event

the Commission deletes Channel 6 from Rochester and substitutes Channel 5 in its place.

10. In the Existing "Table" of television allocations set forth in Section 3.606 of the Commission's Rules, Channels 2, 4, 5, 7 and 9 are allocated to Cleveland, Ohio. A construction permit to operate on Channel 9 in Cleveland is held by the Empire Coil Co., Inc (WXEL). In the proposed "Table" in Appendix C attached hereto the Commission proposes to delete Channels 2, 7 and 9 from Cleveland and substitute Channels 8, 11, 40 and 42 in their place. Should this proposal be adopted by the Commission, it is hereby [fol. 32] proposed to modify the construction permit held by Empire Coil Co., Inc. for television station WXEL in Cleveland by substituting therein Channel 11 in place of Channel 9. In the light of the information set forth in paragraph "7" above, it is the judgment of the Commission that its actions will result in the maximum utilization of television channels in the United States and Canada, and will promote the public interest, convenience and necessity, and the provisions of the Communications Act of 1934, as amended, *Accordingly*, pursuant to the provisions of Section 303(f) and 312(b) of the Communications Act of 1934, as amended, Empire Coil Co., Inc. (WXEL), Cleveland, Ohio, is directed to *Show Cause* in these proceedings and in accordance with the procedures set forth in paragraphs 14 and 15 herein, why its construction permit should not be modified accordingly in the event the Commission deletes Channel 9 from Cleveland and substitutes Channel 11 in its place.

11. On May 25, 1949, the Commission adopted an order (FCC 49-729), which added the following issue in Docket No. 8976:

> "5. To receive evidence and data with respect to the question whether there should be an allocation of the band 470-500 Mcs to multi-channel broad band common carrier mobile radio operation in lieu of television broadcasting."

This issue was added to the proceeding upon the petition of The Bell Telephone Laboratories, Inc., requesting an allocation in the band 400-500 Mcs. for multi-channel broad band common carrier mobile radio operation in lieu of television broadcasting. The Commission is not making any

proposal with respect to the above issue but will consider all written comments and evidence supporting or opposing said petition. Interested persons may submit written comments or evidence concerning said proposals by complying with the procedures set forth in paragraphs 14 and 15 herein.

12. On November 30, 1948, Raymond M. Wilmotte and Paul A. deMars filed with the Commission a petition entitled "A Petition Regarding a System for Television at U.H.F.," urging that the Commission adopt a proposed system of television broadcasting referred to as "Polycasting." Petitioners, and other interested persons, may submit details concerning the said proposal and may offer evidence with respect thereto by complying with the procedures set forth in paragraphs 14 and 15 herein.

[fol. 33] 13. (a) Appendix A hereto describes the conditions upon which the Commission will receive proposals for a change in Transmission Standards on Channels 2 through 55, looking toward the establishment of color television. Persons with relevant information, especially those who have heretofore supplied information concerning color television or have demonstrated experimental color operation to the Commission, should file proposals in accordance with Appendix A and should be prepared to submit information concerning color breakup, flicker, color fringing, image registration, color fidelity, picture brightness, camera light efficiency, definition, field tests, and details with respect to modification of transmitters and receivers to provide the degree of compatibility contemplated by Appendix A, paragraph II-C-2.

(b) The Commission has heretofore received evidence concerning a method of airborne television, or "Stratovision", in Docket No. 8976.

(c) The Commission has received informal suggestions concerning the possible provision for non-commercial educational television broadcast stations in the 470 to 890 Mc. band.

(d) Interested persons desiring to submit comments or evidence concerning these matters, or concerning other matters upon which the Commission is making no proposal at this time, may do so upon complying with the procedures set forth in paragraphs 14 and 15 herein.

14. (a) *On or before August 8, 1949*, any interested person who is of the opinion that the proposals herein

should not be adopted or should not be adopted in the form set forth herein, may file with the Commission written comments (including data, views or arguments) concerning said proposals, and interested persons favoring the proposals herein may file such written comments in support thereof. All written comments must be clear and specific as to the proposals made therein and must be accompanied by supporting engineering statements. No comments or statements will be accepted after August 8, 1949, unless a later date is provided by Commission order. Any person filing comments who owns or has the right to sublicense United States unexpired patents with claims directed to or covering operations or equipment specifically called for by the transmission standards proposed herein, or which are proposed by other persons during this proceeding, shall file a statement on or before the opening date of the hearing or such later date as the Commission may by order provide showing (i) the number of each such patent, and (ii) the pertinent claims therein.

(b) *On or before August 19, 1949,* interested persons desiring to submit written comments (including data, views or arguments) *in opposition to comments or counterproposals* filed with respect to the Commission's proposals herein may file such opposing comments, which must be accompanied by supporting engineering statements. Oppositions to counterproposals will not be accepted by the Commission if such oppositions advance any new proposals, nor will they be accepted after August 19, 1949, unless a later date is provided by Commission order.

(c) In accordance with Section 1.764 of the Commission's Rules and Regulations, an original and 14 copies of such written comment, statement or exhibit shall be filed with the Commission.

[fol. 34] 15. (a) Notice is hereby given that a hearing will be held in the above-entitled matters, before the Commission *en banc*, commencing on August 29, 1949, at 10:00 a.m. in Washington, D. C., (at a place to be designated by subsequent notice) for the purpose of hearing testimony and receiving evidence regarding the Commission's proposals, such other proposals as are duly and timely filed by interested persons, and such other evidence as the Commission may consider desirable and pertinent. Any interested person who has filed written comments (including data, views or arguments) in accordance with the provisions of

Paragraph 14 herein may participate in said hearing. The Commission reserves the right to require the presentation of evidence on any matter pertinent to this hearing by any person whether or not such person has filed a statement or comments. In order to expedite the conduct of the hearing, and to enable all parties to be fully prepared in advance thereof, it is urged that every effort be made by interested parties to file 10 copies of their proposed exhibits at least 5 days prior to the date of hearing. Amendments and supplements to the exhibits should be filed as soon as possible prior to the hearing.

(b) Comments and statements directed toward specific allocations in the Commission's proposed "Table" in Section 3.606 of the Commission's Rules and Regulations shall show not only the effect which the proposals in said comments and statements will have on the service in the particular communities involved but also *the overall effect* thereof with specific reference to the priorities set forth in Section III-A-1 in Appendix A herein.

(c) Persons who have failed to file timely written comments or statements as required by paragraphs 14 and 15 herein will not be permitted to adduce testimony or to offer any exhibits in evidence at the hearing, nor will such persons be permitted to cross-examine any of the witnesses appearing at the hearing.

(d) In view of the comprehensivs nature of the proceedings herein and the desirability of concluding the hearing as soon as possible, it is requested that parties incorporate as much evidence as is practicable in the exhibits which they plan to submit. In this connection participants will be required to submit at the hearing at least 20 copies of each exhibit to the Commission. In addition, participants should plan, if possible, to have available 100 additional copies of each exhibit for distribution to interested persons.

(e) In appropriate instances the Commission will permit participants at the hearing to incorporate by reference portions of the records of prior hearings *provided* that notice of intention to make such offer at the hearing is set forth in the written comments filed by the offering party and that the docket number and transcript pages are specifically identified in said written comments.

[fols. 35-36] 16. Following the closing of the record and the conclusion of oral arguments, the Commission upon consideration of all proposals, counterproposals, and evidence

in this proceeding will adopt such rules, regulations and standards, as will best serve the public interest, convenience or necessity.

17. Persons who are contemplating filing applications for new television broadcast stations, or filing amendments to pending applications for new television broadcast stations, are requested to postpone the filing of such applications or amendments pending a final determination on the rules, standards and allocations proposed in this proceeding. Upon the issuance of final rules, standards and allocations in this proceeding, the Commission will issue an announcement providing a reasonable period of time during which new applications may be filed and pending applications may be amended, in conformity with the new rules, standards and allocations. Applicants are requested to comply with this paragraph in order to eliminate unnecessary administrative effort and to save themselves the possibly needless expense of preparing and filing applications and amendments which may not be in conformity with the rules, standards and allocations as finally adopted.

18. A copy of this Notice will be mailed to each person who appeared in Part I of the proceedings in the above-entitled matters. Subsequent notices will be served only on persons who participate in the proceedings herein in accordance with the provisions of paragraphs 14 and 15 of this Notice.

19. Authority to issue the proposals herein is vested in the Commission by Sections 4(i) 301, 303(b), (c), (d), (e), (f), (g), (h), (r), and 307(b) of the Communications Act of 1934, as amended.

Federal Communications Commission, T. J. Slowie, Secretary.

Adopted: July 8, 1949.
Released: July 11, 1949.

38055-3-7/49

APPENDIX A

The Commission proposes to amend its Rules and Regulations and Standards of Good Engineering Practice Concerning Television Broadcast Stations so as to accomplish the matters set forth below:

I. Number of Channels

A. In addition to the twelve V.H.F. six megacycle channels presently assigned (Numbered 2 through 13) for television broadcasting, the Commission proposes to add an additional 42 six megacycle channels which will be numbered consecutively channels 14 through 55. Channel 14 will begin at approximately 470 Mc or 500 Mc depending upon the action to be taken by the Commission with respect to the request of The Bell Telephone Laboratories, Inc. for space in the U.H.F. band for a broad-band system of Mobile Communications (See Order of May 25, 1949 - F.C.C. 49-729). The remaining channels will be in a continuous band immediately contiguous to Channel 14; 32 of these channels will be used for Metropolitan stations and 10 for Community Stations.

B. The balance of the band which is allocated to experimental television broadcasting will remain available for further experimentation in television broadcasting.

II. Transmission Standards

A. The Commission proposes that the Transmission Standards for channels 14 through 55 as well as for channels 2 through 13 shall be those standards which are set forth in the Standards of Good Engineering Practice concerning Television Broadcast Stations under Heading 2 entitled "Transmission Standards and Changes or Modifications Thereof."

B. The Commission will give consideration to proposals for a change in Transmission Standards on channels 2 through 55 looking toward color television or other television systems. Any such proposals shall:

1. Be specific as to any change or changes in the Transmission Standards proposed; and

2. Shall contain a showing as to the changes or modifications in existing receivers which would be required in order to enable them to receive programs transmitted in accordance with the new standards.

PROPOSED

APPENDIX A

C. It is proposed to consider changes in Transmission Standards for channels 2 through 55 only upon a showing in these proceedings that:

1. Such system can operate in a 6-megacycle channel; and

2. Existing television receivers designed to receive television programs transmitted in accordance with present transmission standards, will be able to receive television programs transmitted in accordance with the proposed new standards simply by making relatively minor modifications in such existing receivers.

III. Allocation Principles

A. Allocation Table

1. The television channels available for use in the various communities are set forth in the "Table" in Appendix C. In setting up this table, the Commission has endeavored to meet the twofold objective set forth in Sections 1 and 307(b) of the Communications Act of 1934 - to provide television service, as far as possible, to all people of the United States and to provide a fair, efficient and equitable distribution of television broadcast stations to the several states and communities. The Commission has set forth below the principles, in terms of priority, which form the basis of the allocation table. These priorities are as follows:

PROPOSED

Priority No. 1 - To provide at least one television service to all parts of the United States.

Priority No. 2 - To provide each community with at least one television broadcast station.

Priority No. 3 - To provide a choice of at least two television services to all parts of the United States.

Priority No. 4 - To provide each community with at least two television broadcast stations.

APPENDIX A

Priority No. 5 - Any channels which remain unassigned under the foregoing priorities will be assigned to the various communities depending on the size of the population of such community, the geographical location of such community, and the number of television services available to such community from television stations located in other communities.

2. As used in the preceding subsection "community" includes only those communities which had at least one authorization for a Standard, FM or Television broadcast station on July 1, 1949.* All communities within a metropolitan district shall be considered as a single community for the purpose of the preceding subsection except where the allocation table specifically otherwise states. Whenever an assignment is made in the allocation table to a metropolitan district, such assignment shall be available to any community located within such Metropolitan District, except where otherwise specifically provided in the allocation table. In the case of some metropolitan districts, some of the communities are located at such a distance from the principal city thereof that a better coverage of the metropolitan district results if a separate assignment is made to such communities. The following are the exceptions mentioned above:

Waukegan, Illinois; Gary, Indiana; Annapolis, Maryland; Brockton, Mass.; Pontiac, Michigan; Asbury Park, New Jersey; Uniontown and Greensburg, Pa.; New Brunswick, New Jersey.

Accordingly, the Commission proposes specific assignments in each of these cities on one of the ten community channels, 46-55.

3. Whenever an assignment is made in the allocation table to a community not within a Metropolitan District, such channel will also be available, without the necessity of rule-making proceedings, to any other community, not within a Metropolitan District, whose geographical center is located within 15 miles from the geographical center of the community in question.

PROPOSED

* As to some of these communities, no provision has been made in the Allocation Table. It is contemplated that these communities will utilize community channels.

4. Except as provided in "2" and "3" above, no application for a television station in a community specified in the Allocation Table will be accepted for filing which specifies a channel not contained in the Allocation Table. Persons desiring to apply for a channel not specified in the Allocation Table must first secure an amendment to such table through appropriate rule-making proceedings. Changes will be made in the Allocation Table only if a showing is made that:

   a. Such change is consistent with the priorities set forth in III-A-1;

   b. Such change will not result in the reduction of the basic service area of an existing television broadcast station or of a television station provided for in the Allocation Table as defined in III B; and

   c. Such change is in the public interest.

5. If a person desires to file an application for a community not within a metropolitan district and not specified in the Allocation Table, he may file an application for a community station on Channels 46-55, without the necessity of rule-making proceedings. If such person desires a Metropolitan station in a community not specified in the Allocation Table, he must first secure an amendment to such table through appropriate rule-making proceedings by making the showing specified in the preceding paragraph.

6. As used in this part, Metropolitan Districts are as defined in the United States 1940 Census.

B. Grades of Service*

1. Television broadcast service is classified into three grades of service which are defined in the table below:

PROPOSED

* The methods and assumptions used in establishing the grades of service and the required field intensities in accordance with the above definitions, are set forth in Appendix B.

APPENDIX A

Grade of Service	Permissible Interference Ratios		Service Availability	
	Co-Channel	Adjacent Channel		
	Desired to Undesired	Desired to Undesired	Percent Time	Percent Locations
A	55 db	20 db	90%	90%
B	46 db	12 db	90%	70%
C	40 db	6 db	90%	50%

It is recognized that by means of synchronized or offset carrier operation some improvement in the interference ratio is possible. The Commission hopes to encourage such operations but does not intend to use them as a means of reducing separation between stations but rather to extend the service area of stations and to improve the quality of television reception.

2. The following median field intensities are required for service:

Grade	Field Intensity in db above 1 uv/m		
	Channels 2-6	Channels 7-13	Channels 14-55
A	74(5000)*	77(7000)	80(10,000)
B	68(2500)	71(3500)	74(5,000)
C	47(220)	56(632)	62(1,264)

PROPOSED

3. The Commission proposes the use of iso-service contours which express service in terms of the ratio between desired and undesired signal in decibels, or the minimum required signal levels in decibel above one microvolt per meter. This has been done in order to facilitate computation of service and interference field intensities. Likewise, the same terms may be carried over to the output of the transmitter, transmission line loss and antenna gain. This has the advantage of using the same unit throughout the service whether in the transmitting equipment or in the field and has the additional advantage that a decibel of power added at the transmitter results in a decibel of increased field intensity. In order to place these matters

* The field intensities are expressed in db above one microvolt per meter. The numbers in parentheses are the field intensities in microvolts per meter.

on a related basis, the decibels with respect to transmitter power and antenna gain as well as field intensity must be expressed as decibels with reference to some given level.

Field intensity is expressed either in decibels above an undesired signal or decibels above a reference level which has been chosen as one microvolt per meter. A convenient reference level of transmitter power is 1 kilowatt. The propagation curves of the Report of the Ad Hoc Committee, Volume I,* referred to in Appendix B, are based upon the radiation in the equatorial plane of a half wave dipole antenna having an effective radiated power of one kilowatt. Antenna gain is expressed as the ratio in db of the maximum radiation from the antenna to the radiation in the equatorial plane of a half wave dipole with equal power imput.

C. Classes of Stations

1. Community Stations: Television channels Nos. 46 to 55 will be assigned exclusively to community stations for use only in those communities which are not part of a metropolitan district (except for those special cases set forth in IIIA2) and to which no assignment has been made in the Allocation Table. Community stations will be authorized with an effective radiated peak power of not less than 7 db (5kw) and not more than 13 db (20 kw) and with an antenna height of 500 feet above average terrain as determined by methods prescribed, in the Standards of Good Engineering Practice Concerning Television Broadcast Stations. Co-channel community stations will not be assigned less than 140 miles apart, and adjacent channel community stations will not be assigned less than 60 miles apart.

2. Metropolitan Stations:

   a. Metropolitan stations are designed primarily to render service to a single metropolitan district or a principal city and to the surrounding rural area.

PROPOSED

* This Report was made public on June 8, 1949 (See Public Notice FCC 49-773). Copies of the Report are available on request.

APPENDIX A

b. Except as provided in "5" below, metropolitan stations will be authorized with an effective radiated peak power lying between the maximum and minimum limits set forth in the table below with an antenna height of 500 feet above the average terrain, as determined by the methods prescribed in the Standards of Good Engineering Practice Concerning Television Broadcast Stations.

Channels	Minimum	Maximum
2 - 6	10 db (10 kw)	20 db (100 kw)
7 - 13	10 db (10 kw)	20 db (100 kw)
14 - 55	10 db (10 kw)	23 db (200 kw)

3. Use of Antenna Heights other than 500 feet--Where higher antenna heights are available, they should be used but in such cases the Commission will require a reduction in the effective radiated peak power so that interference caused to the Grade A service of adjacent and co-channel stations shall not be greater than that which would be caused by the maximum power recognized for a metropolitan or community station with antenna height of 500 feet above average terrain in accordance with the methods specified in Appendix B. Where it is shown that an antenna height of 500 feet is not available, the Commission may authorize the use of a lower height antenna but will not permit an increase in radiated power in excess of the maximum listed above.

4. Horizontal Increases in Power--The Commission intends from time to time to consider horizontal increases in maximum power for all community and metropolitan stations.

5. Wide Coverage Stations or Rural Stations--The Commission proposes to modify Section 3.605 of the Rules and Regulations dealing with rural stations. The Commission intends to provide for the use of wide coverage stations located at high elevations consistent with other sections of the Rules and Regulations and the Allocation Table.

PROPOSED

The power height relation used in calculating the Allocation Table will be regarded as a "norm" and power or antenna heights greater than the Allocation Table will be authorized, provided the increase is beneficial to the Allocation Table and is consistent with the Priorities stated in Section III A.

D. Service Areas of Television Broadcast Stations

1. Each television broadcast station shall render Grade A service, whenever technically feasible, but in no event less than Grade B service, to the entire community or the entire metropolitan district, and such entire community or metropolitan district shall constitute a station's basic service area.* No television station will be authorized either before or after a hearing which, by reference to the methods set forth in Appendix B, does not render service as above specified and the engineering proposal of which precludes operation with maximum power consistent with the rules contained herein.

2. No station will be authorized either before or after a hearing, which, by reference to the methods set forth in Appendix B, will reduce the basic service area of an existing station (at its authorized site) or of a station provided for in the Allocation Table (at an assumed site in the geographical center of its community), operating with maximum power. Reduction of Grade C service area, or of Grade B or Grade A service areas beyond the basic service area described above, of an existing station (at its authorized site) or of a station provided for in the Allocation Table (at an assumed site in the geographical center of its community), operating with maximum power, will be permitted only if the loss in service does not violate any of the priorities set forth above and that the new service created is of a higher priority than the service area being reduced.

3. III C above makes provision for both minimum and maximum power for the several classes of stations. Since television is a new service and the number of receivers in the hands of the public is relatively

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*In case of the metropolitan districts mentioned in III A-2 above, the communities specifically mentioned in that paragraph shall not be part of the basic service area of stations located in the metropolitan district but shall be separate basic service areas of stations located in those communities.

small, it is recognized that it may require several years for some stations to reach their maximum power. In order to make sure that the public will receive the maximum television service possible, the Allocation Table has been constructed on the basis of maximum power for each station. Any changes in the allocation plan will have to be based upon a showing that the allocation proposed will be able to utilize maximum power and without resulting in any reduction in the basic service area (as above defined) of existing stations (from their authorized site) or of stations specified in the Allocation Table (at an assumed site in the geographical center of the community) operating with maximum power.

4. Methods for describing service areas and interference are set forth in Appendix B. The methods therein described include the propagation of radio waves through the lower atmosphere only. These propagation charts are based on an extensive number of measurements made at various locations over a long period of time. It is recognized that these charts will have to be revised from time to time as more measurements are made and interested persons are encouraged to make as many measurements as possible and submit them to the Commission. The Commission is satisfied that on the basis of the data presently available to it the data underlying the propagation charts are sufficient to afford an adequate statistical basis of describing field intensities under average conditions, but it is expected that there may be substantial variations in individual areas. It is also realized that propagation to distances of the order of 500 to 1500 miles via the sporadic E layer and to distances beyond via the F2 layer may take place for small percentages of the time in certain of the channels. However, since such interference may occur over extremely large distances, it is not possible to protect stations against such interference unless operation on such channels were limited to one or at the best a few stations. In order to provide stations for the various communities, the Commission has determined that the overall public interest is better served by not protecting stations against this type of interference.

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E. Directional Transmitting Antennas

1. With the exceptions noted in the footnote*, the Allocation Table makes no provision as such for directional transmitting antennas and the Commission does not propose to make changes in the plan based upon the use of such antennas. However, it is recognized that a directional transmitting antenna may be useful in certain situations in order that a particular site may be utilized or overall service improved. Accordingly, directional transmitting antennas will be permitted in appropriate cases for use on channels contained in the Allocation Table.

2. The authorization of a directional antenna will not excuse compliance with the service area requirements set forth above nor will it be the basis for permitting reduction of basic service areas.

3. Since the wave-lengths involved in television are much shorter than in the case of standard broadcasting, it is evident that wires, towers, and other objects which may serve as reflecting surfaces have considerably larger dimensions in terms of wave lengths in the television band as compared with the standard broadcast band and hence the problem of external reflections is considerably aggravated. Accordingly, nulls below a certain value become doubtful in their protective value since they may be counteracted by the external reflections. Based upon the best available data, the Commission is of the opinion that nulls deeper than minus 10 db as compared to the maximum value of radiation in any direction may not be practicable.

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*The two exceptions are WGAL-TV on Channel 4 in Lancaster, Pa., and WDEL-TV on Channel 7 in Wilmington, Delaware. Both of these stations were authorized under the original allocation plan with 1 kw power and are too close to other stations on the same channel to permit operation with maximum power on a non-directional basis. The Commission proposes to permit those stations to utilize directional antennas in order to permit them eventually to utilize increased power.

38055-4-7/49

APPENDIX B

I. Specifications of Required Field Intensities.

The required field intensities specified in Appendix A, Section III B, were determined in accordance with the following assumptions and procedure:

A. Grade A Service - Required Field Intensities, in db above 1 microvolt per meter.

(a) To overcome receiver noise,

		63 Mc	195 Mc	600 Mc[1]
(1)	Thermal Noise (db)[2]	7	7	7
(2)	Receiver Noise Figure	12	12	15
(3)	Peak Vis. Car./RMS Noise	30	30	30
(4)	Trans. Line Loss[3]	1	2	5
(5)	Antenna Eff. Length[4]	-3	6	8
(6)	Local Field Intensity	47	57	65
(7)	90% Terrain Factor[5]	11	11	15
(8)	Median Field Int.[6] (db)	58	68	80

(b) To overcome local noise and interference,

	63 Mc	195 Mc	600 Mc
Median Field Intensity (db)	74	77	80

(c) Required urban field intensities to overcome both (a) and (b),

	63 Mc	195 Mc	600 Mc
Median Field Intensity (db)	74	77	80

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1 For the purposes of preparing a table of allocations, the frequencies herein specified are to apply to the television channels as follows: 63 Mc - channels 2-6; 195 Mc - channels 7-13; 600 Mc - channels 14-55.

2 Reference level db above 1 uv across 300 ohms impedance.

3 Transmission line is assumed to consist of 50 feet of RG 59 U coaxial cable for 63 and 195 megacycles and of 50 feet of twin-lead cable at 600 megacycles.

4 The antenna is assumed to consist of a half-wave dipole at 63 and 195 megacycles and of a rhombic with 8 db gain at 600 megacycles.

5 The terrain correction factors for 63 and 195 megacycles are taken from the curve R(L) and the factor for 600 megacycles taken from the curve r(L) of Figure 2 of the Ad Hoc Report.

6 Time fading of the desired signal is not considered significant for grade A service. The median field intensity is equivalent to the field F (50,50) specified in Appendix B, Section II A.

For the purpose of estimating the required field intensities at the antenna, it has been assumed that half-wave dipoles connected to the set by 50 feet of RG 59U coaxial line are typical for 63 to 195 Mc operation. In the frequency range near 600 Mc, a small rhombic with 300 ohm line has been assumed. It is realized that it is neither desirable nor practical in some heavily built-up areas to meet these assumptions and that inside antennas will be used. If it is assumed that the inside antenna will have an effective length equal to that of a half-wave dipole and that the transmission line loss is negligible, the local field intensities required will be 46, 55 and 68 db above one microvolt per meter, respectively, for 63, 195 and 600 Mc. However, the median field intensities required under these conditions cannot be stated with assurance, because the average terrain distributions which have been calculated from available measurements apply only to exterior conditions in suburban and rural areas. If the range of signal variation in building interiors is comparable to the exterior range, the 74 db median signal level (5000 microvolts per meter) specified to overcome local noise and interference in (b) would be adequate at 63 and 195 Mc. There is some opinion, but no measurements, which indicate that the 74 db signal is adequate at 63 Mc but not at 195 Mc. In order to meet this opinion and to equalize the grade A service areas for equal powers which are indicated at 63 and 195 megacycles, the field intensity required for grade A service at 195 megacycles has been raised to 77 db. Until reliable data are available to indicate otherwise, the above median field intensities will be required within the principal city of the metropolitan area. Until experience indicates the practicability of operating indoor antennas at frequencies near 600 megacycles, only outdoor antennas will be assumed.

PROPOSED

B. Grade B Service - Required Field Intensities, in db above 1 microvolt per meter.

(a) To overcome receiver noise,

		63 Mc	195 Mc	600 Mc
(1)	Thermal Noise (db)	7	7	7
(2)	Receiver Noise Figure	12	12	15
(3)	Peak Vis. Car. RMS Noise	30	30	30
(4)	Trans. Line Loss	1	2	5
(5)	Antenna Eff. Length	-3	6	8
(6)	Local Field Intensity	47	57	65
(7)	70% Terrain Factor	4	4	6
(8)	90% Time Factor	3	3	3
(9)	Median Field Intensity (db)	54	64	74

(b) To overcome local noise and interference,

	63 Mc	195 Mc	600 Mc
Median Field Intensity (db)	68	71	74

(c) Required urban field intensities to overcome both (a) and (b),

	63 Mc	195 Mc	600 Mc
Median Field Intensity (db)	68	71	74

The median field intensities for urban grade B service are 6 db lower than those for grade A service. This reduction is essentially a reduction from the desired quality of service at 90% of locations to 70% of locations in accordance with Appendix A, Section III B 1.

C. Grade C Service - Rural Field Intensities, in db above 1 microvolt per meter, required to overcome receiver noise.

		63 Mc	195 Mc	600 Mc
(1)	Thermal Noise (db)	7	7	7
(2)	Receiver Noise Figure	12	12	15
(3)	Peak Vis. Car./RMS Noise	30	30	30
(4)	Trans. Line Loss	1	2	5
(5)	Antenna Effective Length[7]	-9	0	-3
(6)	Local Field Intensity	41	51	60
(7)	50% Terrain Factor	0	0	0
(8)	90% Time Fading Factor[8]	6	5	2
(9)	Median Field Intensity (db)	47	56	62

D. Specifications of Permissible Interference Ratios.

The permissible interference ratios specified in Appendix A, Section III B, were determined in accordance with the following assumptions and procedure. The permissible cochannel desired to undesired station ratio available at the location of the receiving antenna was taken to be 40 db. The permissible adjacent channel ratio available at the receiving antenna location was taken as 6 db. In order to make the permissible ratios, which are in terms of the relative field intensities expected at 50% of receiver locations, available to the percentages of receiving locations specified for grades A and B service in Appendix A, Section III B, the following terrain factors have been added:

(a) Grade A Service.

	Cochannel	Adjacent Channel
(1) Local Desired/Undesired Ratio	40	6
(2) 90% Terrain Factor r(L)	15	15
(3) 50% Location d/u Ratio	55 db	21 db

(b) Grade B Service.

	Cochannel	Adjacent Channel
(1) Local Desired/Undesired Ratio	40	6
(2) 70% Terrain Factor r(L)	6	6
(3) 50% Location d/u Ratio	46 db	12 db

[7] Antennas with a 6 db gain compared to a dipole are assumed for 63 and 195 megacycles, and an antenna gain of 13 db for 600 megacycles.

[8] The time fading factors decrease with increasing frequency because the grade C service radii decrease.

(c) Grade C Service.

	Cochannel	Adjacent Channel
50% Location d/u Ratio	40 db	6 db

The terrain factors were taken from the curve r(L) of Figure 2 of the Ad Hoc Report for 90% and 70% of the receiver locations, respectively. Grade C service is specified for 50% of receiver locations, and no terrain factor is required. Permissible ratios which are 6 db higher for grade A service and 2 db higher for grade B service on channels 14 through 55, appear to be justifiable on the basis of present knowledge.

II. Propagation of Television Signals.

For the purpose of predicting the propagation of television signals for the estimation of service and interference areas under the rules proposed in Part II of these proceedings, the following procedures have been observed, in accordance with the recommendations of the Ad Hoc Committee.

A. Prediction of Service Field Intensities.

The field intensities of the service field which will be available, at any percentage of receiving locations for any percentage of the time may be described by the following relation:

(1) $$F'(L,T) = P' + F(50,50) + R(L) + R(T)$$

Where F'(L,T) is the field intensity for L percent of the receiving locations and T percent of the time expressed in decibels above 1 microvolt per meter, P' is the radiated power in db above 1 kilowatt, F(50,50) is the field intensity in decibels above 1 microvolt per meter for 50 percent of the locations and 50 percent of the time for a radiated power of one kilowatt, R(L) is the terrain distribution factor for L percent of locations, and R(T) is the time distribution factor.

The effective radiated power, P', is expressed in decibels above 1 kilowatt radiated from a half-wave dipole and may be calculated by means of the following formula:

(2) $$P' = 10 \log_{10} P - P'' + G$$

In the above, P denotes the actual transmitter power delivered to the transmission line expressed in kilowatts, P" denotes the transmission line and antenna power loss expressed in decibels, and G denotes the gain of the transmitting antenna array in the direction of the receiving location expressed in decibels relative to that of a half-wave dipole.

Appropriate values of F(50,50) may be found in Figures 3, 4, 6 and 7 of the Report of the Ad Hoc Committee, Volume 1. Figure 3 is to be used for channels 2, 3 and 4, Figure 4 for channels 5 and 6, Figure 6 for channels 7 through 55, and Figure 7 for channels 2 through 55 for distances beyond 200 miles, in accordance with the procedure described below. The charts show the field intensities in db above one

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microvolt per meter for one kilowatt of effective radiated power to be expected at 50% of the receiving locations for 1%, 10% and 50% of the time, for antenna heights from 100 feet to 2000 feet. The field intensities are based on an effective power of one kilowatt radiated from a half-wave dipole in free space, which produces an unattenuated field intensity at one mile of 103 db above one microvolt per meter (137.6 millivolts per meter). The antenna height to be used with these charts in any particular case is the equivalent height of the center of the radiating element above the average height of the profile between 2 and 10 miles from the transmitter along the desired radial. Where the resulting equivalent antenna height lies between the curves for given antenna heights, interpolation between the curves in proportion to the logarithm of the antenna height shall be used. Special consideration must be given to antenna heights in excess of 2000 feet. Estimates of the field intensities to be obtained from antennas up to 5000 feet in height are contained in Reference D to the Ad Hoc Report. It should be noted that the 5000 feet curve was not endorsed by the Ad Hoc Committee.

For simplicity, the charts do not show the service fields for 90% and 99% of the time, but these fields lie below the 50% curve by the same amounts that the 10% and 1% curves, respectively, lie above the 50% fields. Thus, the time distribution factor R(T) for the 90% and 99% fields may be found by subtracting from the 50% fields the number of db by which the latter lies below the 10% and 1% fields, or:

(3) $F(50,90) = F(50,50) + R(T = 90) = F(50,50) - \left[F(50,10) - F(50,50)\right]$

(4) $F(50,99) = F(50,50) + R(T = 99) = F(50,50) - \left[F(50,1) - F(50,50)\right]$

For other values of T, use may be made of the relation $R(T) = R(T = 1)\ k(T)$. The value of k(T) for any percentage of time T is given in Figure 2 of the Ad Hoc Report.

In order to determine the field intensity which will be exceeded at some percentage of the receiving locations other than 50%, use is also made of Figure 2. For channels 2 through 13, the curve labelled R(L) is to be used; for channels 14 through 55, the curve labelled r(L) is to be used. The departure from the 50% value in db, shown on the left scale, corresponding to the desired percentage of locations on the bottom scale is to be added to the field intensity in db above one microvolt per meter existing at 50% of locations.

For channels 2-13,

(5) $F(L,50) = F(50,50) + R(L)$

For channels 14-55,

(6) $F(L,50) = F(50,50) + r(L)$

Thus, the terrain factor for 90% of locations corresponds to -11 db for channels 2-13 and -15 db for channels 14-55, as shown in Appendix B F A(a)(7).

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B. Prediction of Interference from One Undesired Station.

The percentage of receiving locations, L, at any given distance from a desired station and one undesired station at which an acceptable ratio, A, of desired-to-undesired signals is exceeded for T percent of the time may be determined from the following equation:

(7) $$r(L) = A + P'_u + F_u(50,50) - F_d(50,50) - k(T)\sqrt{R_d^2(1) + R_u^2(1)}$$

The subscript d denotes values applicable to the desired signal and the subscript u denotes values applicable to the undesired signal. As explained above, the effective radiated powers of the desired and undesired stations P'_d and P'_u are expressed in db above one kilowatt radiated from a half-wave dipole. $F_u(50,50)$ and $F_d(50,50)$ are taken from the appropriate curve of Figures 3 through 7 of the Ad Hoc Report. $R_d(1)$ and $R_u(1)$ are the time distribution factors for 1% of the time for the desired and the undesired field intensities, respectively. These may be determined by subtracting the (50,50) field intensity from the F(50,1) field intensity indicated for the proper distances on the appropriate curves of Figures 3 through 7 of the Ad Hoc Report.

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For channels 2 through 13, the percentage of locations at which the ratio A is exceeded may be read from the probability distribution, r(L), as a function of L in Figure 2 of the Ad Hoc Report. For channels 14-55, a new x(L) line is to be plotted on Figure 2, passing through the common intersection at 0 db and 50% of the locations and having a slope 1.4 times as great as the slope of r(L). x(L) will pass through the -21 db point at 90% of locations.

If the distance at which an acceptable ratio A is to be obtained at a given percentage of locations and for a given percentage of time T is to be determined rapidly, the solution using the above exact expression may be too laborious. A useful approximation is based on the fact that $\sqrt{R_d^2(1) + R_u^2(1)}$ approaches $R_u(1)$ when $R_u(1)$ is much larger than $R_d(1)$. In Reference F it is shown that the approximation gives values which are low by less than 3 db when $R_u(1) = 2.5R_d(1)$. This will always be the case in cochannel interference computations, and nearly always for adjacent channels, when considering service of the order of 90% of the time or 90% of the locations. This is tantamount to assuming for the purposes of rapid calculation that the desired signal is steady and equal to its median value, and that the undesired signal alone is variable.

This makes possible simple graphical methods of computing iso-service contours completely around the desired station. For example, at a point where $F_d(50,50)$ is A decibels greater than $F_u(50,1)$, the ratio A will be exceeded at 50 percent of locations and for 99 percent of time. Thus, the charts for the desired signal F(50,50) and the tropospheric charts F(50,1) and F(50,10) of Figures 3-7 can be used to determine the service contours for 99, 90 percent of the time, respectively, for 50 percent of the locations.

This approximate method can also be applied to the case where it is desired to locate the contour at which an acceptable ratio is exceeded for a percentage of the locations other than 50 percent, by subtracting from the ratio A in db the value of r(L) from Figure 2 corresponding to the percentage of locations for which it is desired to determine the service contour. For example, if it is desired to determine the contour at which the ratio A = 40 db (100:1) will be exceeded at 90 percent of the locations for 90 percent of the time, the value (- 15) db should be subtracted from the 40 db ratio, giving an adjusted ratio of 55 db. The desired contour is found to exist at the locus of points for which $F_d(50,50)$ exceeds $F_u(50,10)$ by the adjusted ratio of 55 db, as taken from the appropriate figure of the Ad Hoc Report.

In the interest of expediting the allocations proceedings the Commission is making use of the charts published by the Ad Hoc Committee. Necessary charts in a form acceptable to the industry together with approved procedures for their use, will be included in the Standards at a later date.

III. Station Separations and Service Radii.

The following tables of service radii and of required station separations have been computed by the methods described in the preceding section for the grades of service specified in Appendix A, Section III B and for the powers provided in Appendix A, Section III C.

PROPOSED

Service Radii in Miles

Grade of Service	63 Mc		195 Mc		600 Mc[9]			
	10 db (10 Kw)	20 db (100 Kw)	10 db (10 Kw)	20 db (100 Kw)	7 db (5 Kw)	10 db (10 Kw)	13 db (20 Kw)	23 db (200 Kw)
A	13	20	13	21	7	10	12	21
B	16	27	17	29	12	14	17	29
C	43	57	36	46	28	27	31	43
Cochannel Station Separations in Miles								
A	148	215	111	172	92	103	125	172
B	134	205	108	162	92	99	108	162
C	252	328	164	232	115	125	141	212
Adjacent Channel Station Separations in Miles								
A	50	75	50	73	36	43	49	73
B	50	78	51	78	33	40	46	78
C	105	141	84	109	58	66	75	102

[9] The service radii at 600 Mc are for relatively smooth terrain. For relatively rough terrain such as that found in the vicinity of Washington, D.C. and New York City, an increase of about 10 db in power may be required to provide the same grade of service to the indicated radii.

The Commission has relied upon the above computations and others similarly prepared in accordance with foregoing definitions and methods as well as upon the illustrative studies contained in References E, G, and H of the Ad Hoc Report, in establishing the allocation set forth in Appendix C and in defining the separations for community stations appearing in Appendix A, Section III C.

PROPOSED

38055-1-7/49

APPENDIX C

Introduction

Set forth is a proposed revision of Section 3.606 containing the table showing allocation of television channels to the various communities in the United States. In constructing the table, no change has been made in existing authorizations, with exception of the three stations mentioned in paragraphs 8, 9 and 10 of the Notice of Further Proposed Rule Making. In addition, all existing authoriztions except WDEL-TV in Wilmington, Delaware, and WGAL-TV in Lancaster, Pennsylvania, have been considered on the basis of utilization of maximum power authorized for the class of station in question from their authorized sites. In all other cases, a site in the center of the community in question and maximum power of the station of the class in question have been assumed. An antenna height of 500 feet above average terrain was assumed in all cases.

The Commission has endeavored wherever possible to have a co-channel separation for Metropolitan stations on the VHF band of 220 miles and adjacent channel separation of 110 miles. On the UHF channels it was endeavored to maintain a 200 mile co-channel spacing and a 100 mile adjacent channel spacing. In the case of the community channels which are provided for in the allocation plan, a co-channel separation of 140 miles and adjacent channel separation of 60 miles have been utilized.

The table showing the allocation for the various communities is shown on the following pages; channel assignments marked (c) indicate community channels 46 through 55:

PROPOSED

38055-1-7/49

ALABAMA

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Alexander City	0	17	7
Andalusia	0	26	7
Auburn	0	33	5
Birmingham	4, 6, 13	0	408
Brewton	0	15	3
Clanton	0	27	4
Decatur	0	41	17
Demopolis	0	14	4
Dothan	0	45	17
Enterprise	0	39	4
Eufaula	3	0	6
Florence	0	43	15
Gadsden	0	44	37
Greenville	0	42	5
Huntsville	0	48	13
Jasper	0	28	7
Mobile	5, 8, 11, 48	0	115
Montgomery	7, 12	0	94
Opelika	0	31	8
Selma	0	30	20
Sheffield	0	45	8
Talladega	0	35	9
Tuscaloosa	0	23	27
Troy	0	21	7

PROPOSED

ARIZONA

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Ajo	-	19,21	1
Bisbee	-	19,21	6
Buckeye	-	39	1
Casa Grande	-	24	1
Clarkdale	-	43,45	3
Clifton	-	30	3
Coolidge	-	35,37	2
Douglas	-	15,17	9
Flagstaff	9,11	14,16	5
Ft. Huachuca	-	38	1
Granado	-	15	1
Grand Canyon	-	40	0.6
Globe	-	22	6
Halbrook	-	27,29	1
Hayden	-	28,44	2
Jerome	-	36	2
Kingman	6	29,[illegible]	2
Mesa	-	31,33	7
Miami	-	26	5
Morenci	-	32	3
McNary	-	34	2
Nogales	-	23,25	5
Parker	-	38	1
Phoenix	2,4,5,8,12	15,17	121
Prescott	-	23,25	6
Safford	-	36	2
St. Johns	-	38	1
San Simon	-	40	0.7
Superior	-	42	4
Tombstone	-	29	0.8
Tuscon	3,6,7,10	14,16	37
Wickenburg	-	41	1
Williams	-	30	3
Winslow	-	18,20	5
Yuma	9,13	30,32,34	5

PROPOSED

-3-

ARKANSAS

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Arkadelphia	0	15	5
Batesville	0	20	5
Blytheville	0	44	11
Camden	0	42	9
Conway	0	24	6
Crossett	0	26	5
ElDorado	0	34	16
Fayetteville	0	31	8
Forrest City	0	16	6
Fort Smith	0	16,18	37
Harrison	0	26	4
Helena	0	14	9
Hope	0	22	7
Hot Springs	0	44	21
Jonesboro	0	23,25	12
Little Rock	2, 5, 7, 11	0	127
Magnolia	0	[illegible]	4
Malvern	0	[illegible]	5
Morrilton	0	[illegible]	5
Newport	0	37	4
Paragould	0	18	7
Paris	0	39	3
Pine Bluff	0	38,40	21
Pocahontas	0	34	3
Rogers	0	33	4
Russelville	0	21	6
Siloam Springs	0	42	3
Springdale	0	45	3
Stuttgart	0	33	6
Texarkana	6	25,27	12
West Helena	0	27	5

PROPOSED

C A L I F O R N I A

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Alturas	-	24	2
Arcata	-	30	2
Arroyo Grande	-	32	1
Bakersfield	10	14,16	29
Banning	-	23	4
Barstow	-	25	2
Blythe	-	26	2
Brawley	-	20	12
Bridgeport	-	43	0.4
Calipatria	-	28	2
Calexico	-	22	5
Chico	12	36	9
Coalinga	-	41	5
Colton	-	[illegible]	10
Corona	-	[illegible]	9
Crescent City	-	[illegible]	1
Delano	-	[illegible]	5
Dinuba	-	29	4
El Centro	-	18	10
Escondido	-	41	5
Eureka	-	14,16,28	17
Fillmore	-	28	3
Ft. Bragg	-	24	3
Fresno	8,12	15,17	98
Grass Valley	-	19	6
Hanford	-	19	8
Hollister	-	20	4
Indio	-	31	2
Independence	-	33	0.3
Inyokern	-	43	5
Laguna Beach	-	33	4
Lakeport	-	33	1
Lancaster	-	45	2
Lodi	-	21	11
Lompoc	-	42	3
Los Angeles	2,4,5,7,9,11,13	-	2,904
Merced	-	24	10
Modesto	-	26	16
Mojave	-	20	2
Monterey	-	18	10
Mt. Shasta	-	23	2
Napa	-	29	8
Needles	-	24	4
Oceanside	-	27	5
Oroville	-	27	4
Oxnard	-	22	9
Placerville	-	34	3
Pacific Grove	-	45	6
Palm Springs	-	44	3

PROPOSED

-5-

C A L I F O R N I A (CONT'D)

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Paso Robles	-	25	3
Petaluma	-	23	8
Porterville	-	31	6
Portola	-	41	2
Red Bluff	-	25	4
Redding	-	18,42	8
Redlands	-	29	14
Riverside	-	19,21	31
Sacramento	6,10	38,40	159
Salinas	-	30	12
San Bernardino	-	15,17	44
San Diego	3,6,8	14,16	256
San Francisco/Oakland	2,4,5,7,9,11	-	1,428
San Luis Obispo	-	[illegible]	9
San Jose	-	35,37,39	129
Santa Barbara	-	24,26	35
Santa Cruz	-	[illegible]	17
Santa Maria	-	44	9
Santa Paula	-	18	9
Santa Rosa	-	17	13
Scotia	-	37	1
Sonora	-	32	2
Stockton	-	42,44	79
Susanville	-	22	2
Taft	-	36	3
Trona	-	40	2
Tulare	-	23	8
Turlock	-	28	5
Ukiah	-	20	3
Ventura	-	30	13
Victorville	-	37	3
Visalia	-	27	9
Wasco	-	34	5
Watsonville	-	22	9
Weaverville	-	39	0.7
Westwood	-	45	5
Willits	-	43	2
Willows	-	31	2
Yreka	11,13	-	2
Yuba City	-	15	5

PROPOSED

COLORADO

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Alamosa	12	31	6
Boulder	-	41,43	13
Burlington	-	15	1
Canon City	-	28	7
Cheyenne Wells	-	39	0.7
Colorado Springs	-	20,24	37
Cortez	-	18	2
Craig	-	26	2
Del Norte	-	33	2
Delta	-	25	4
Denver	2,4,5,7,9	-	384
Durango	-	14	6
Ft. Collins	-	33,35	12
Ft. Morgan	-	[illegible]	5
Glenwood Springs	-	[illegible]	2
Grand Junction	-	[illegible]	12
Greely	-	[illegible]	16
Gunnison	-	19	2
Hugo	-	36	1
La Junta	-	16	7
Lamar	-	19	4
Leadville	-	32	5
Limon	-	22	1
Longmont	-	45	7
Los Animas	-	14	3
Loveland	-	27	6
Meeker	-	42	1
Montrose	-	27	5
Oak Creek	-	34	2
Ouray	-	38	1
Pagosa Springs	-	16	2
Pueblo	3,6,8,10	-	62
Rocky Ford	-	42	3
Saguache	-	40	1
Salida	-	44	5
San Luis	-	23	1
Silvertown	-	29	1
Springfield	-	25	1
Steamboat Springs	-	39	2
Sterling	-	34	7
Trinidad	-	18,21	13
Walden	-	37	0.6
Walsenburg	-	26	6
Wray	-	38	2
Yuma	-	17	2

PROPOSED

CONNECTICUT

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Bridgeport	-	14,16	217
Hartford-New Britain	-	30,32,34	502
New Haven	6	20,22	308
Waterbury	-	24,26	145

DELAWARE

Dover	-	47(*)	6
Wilmington /1	7	30,32	189

DISTRICT OF COLUMBIA

Washington	4,5,7,9	32	908

/1 See asterisk footnote to Section III - [illegible] in Appendix A which is part of the Notice of Further Proposed Rule Making herein.

PROPOSED

-8-

F L O R I D A

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Apalachicola	-	44	3
Belle-Glade-Chosen	-	26	4
Clear Water	-	43	10
Crestview	-	18	2
Cross City	-	24	2
Daytona Beach	-	32,34,36	23
Deland	-	19	7
Everglades	-	40	0.6
Fort Lauderdale	-	30,32	18
Fort Meyers	-	35,37	11
Fort Pierce	-	39	8
Gainesville	-	14,16	14
Hollywood	-	34	6
Jacksonville	2,4,5,8,10	[illegible]	173
Key West	-	[illegible]	13
Lake City	-	[illegible]	6
Lakeland	-	[illegible]	22
Lakeworth	-	28	7
Leesburg	-	27	5
Mariana	-	37	5
Melbourne	-	15	3
Miami	2,4,5,8,10,[illegible]	--	172
Ocala	-	38	9
Orlando	-	21,23,25	37
Platka	-	40	7
Palm Beach	-	24	4
Panama City	-	14,16	12
Pensacola	-	20,22,24	37
Perry	-	22	3
Plant City	-	31	7
Quincy	-	19	5
Sebring	-	17	3
St. Augustine	-	42,44	12
St. Petersburg-Tampa	3,6,7,9,11,13	--	210
Sanford	-	29	10
Sarasota	-	20	11
Sulpher Springs	-	45	5
Tallahassee	12	28	16
West Palm Beach	-	14,16,18,22	34
Winter Haven	-	41	6

PROPOSED

G E O R G I A

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Albany	0	42	19
Americus	0	20	9
Athens	0	21, 23	21
Atlanta	2, 5, 8, 11	32, 34	302
Augusta	6, 12	17	66
Bainbridge	9	0	6
Brunswick	0	37, 39	15
Cairo	6	0	5
Cartersville	0	39	6
Cedartown	0	19	5
Columbus	0	36, 38, 40	53
Cordele	13	0	8
Dalton	0	25	10
Dawson	0	28	4
Douglas	0	0	5
Dublin	0	41	8
Fitzgerald	0	27	7
Gainesville	0	15	10
Griffin	0	29	13
Jessup	0	35	3
LaGrange	0	22, 24	22
Macon	0	14, 16, 18	58
Milledgeville	0	26	7
Moultrie	0	15	10
Rome	0	42	26
Savannah	3, 9, 11	0	96
Statesboro	0	19	5
Thomasville	0	32, 34	13
Thomson	0	41	3
Toccoa	0	27	5
Valdosta	0	17	16
Waycross	0	21, 23	17

PROPOSED

I D A H O

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Aberdeen	-	43	1
Arco	-	28	0.5
Blackfoot	-	33	4
Boise	2,4,5,7	-	26
Bonners Ferry	-	31,33	1
Buhl	-	44	2
Burley	-	24	5
Caldwell	-	35,37	7
Cascade	-	18	1
Challis	-	26	0.6
Coeur D'Alene	9,12	41,43	10
Council	-	31	0.7
Diggs	-	39	1
Dubois	-	[illegible]	0.3
Gooding	-	[illegible]	3
Grangerville	-	[illegible]	2
Idaho Falls	3,6	[illegible]	15
Kellogg Wardner	-	16	4
Ketchum	-	36	1
Lewiston	-	32,34	11
Mackay	-	38	0.8
Malad City	-	45	3
Montpelier	-	26	3
Moscow	-	21	6
Mountain Home	-	39	1
Nampa	9,12	23,25	12
Orafino	-	36	2
Pocatello	8,10	35	18
Preston	-	15,17	4
St. Anthony	-	41	3
St. Maries	-	18	2
Salmon	-	15	2
Sandpoint	-	20,22	4
Shoshone	-	14	1
Soda Springs	-	37	1
Twin Falls	11,13	16	12
Wallace	-	39	4
Weiser	-	27,29	4

PROPOSED

ILLINOIS

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Aurora	0	41,43	47
Bloomington	0	26	33
Cario	0	15	14
Carthage	10	0	3
Centralia	0	24	16
Champaign	0	15	23
Chicago	2,4,5,7,9,11,13	0	3,397
Clinton	0	38	6
Danville	0	19	37
Decatur	0	34,36	59
Elgin	0	20	38
Galesburg	0	21	29
Harrisburg	0	32	11
Herrin	0	[illegible]	9
Jacksonville	0	[illegible]	20
Joliet	0	[illegible]	42
Kankakee	0	[illegible]	22
Kewanee	0	16	17
La Salle	0	33	13
Lincoln	0	44	13
Litchfield	0	29	7
Metropolis	0	22	6
Moline-Rock Island-Dav	4,5	42	175
Mt. Carmel	0	35	7
Mt. Vernon	0	27	15
Peoria	6,12	31	105
Quincy	0	18,30	46
Rockford	0	27,29	85
Springfield	3	17	76
Sterling	0	35	11
Urbana	0	22	14
Vandalia	0	40	5
Waukegan	0	46(c)	34

PROPOSED

I O W A

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Ames	4	-	13
Albia	-	34	5
Algona	10	-	5
Atlantic	-	32	6
Boone	-	25	12
Burlington	-	28	26
Carrol	-	40	5
Cedar Rapids	7,9	-	62
Centerville	-	26	8
Chariton	-	41	6
Charles City	12	-	8
Cherokee	-	38	7
Clarinda	-	23	5
Clinton	-	27	26
Creston	-	21	8
Davenport, Rock Island, Moline	4,5	48	175
DeCorah	3	-	5
Des Moines	8,11,13	-	184
Dubuque	-	45	44
Fairfield	-	24	7
Fort Dodge	-	17	23
Fort Madison	-	14	14
Glenwood	-	28	5
Iowa City	2	-	17
Iowa Falls	-	33	4
Keokuk	-	32	15
Knoxville	-	43	7
Marshalltown	-	15	19
Mason City	-	39	27
Muscatine	-	40	18
Newton	-	29	18
Ottumwa	-	20,38	32
Red Oak	-	42	6
Shenandoah	-	16	7
Sioux City	2,5,9	-	82
Storm Lake	-	35	5
Waterloo-Cedar Falls	-	22,36	67
Webster City	-	19	7

PROPOSED

-13-

I N D I A N A

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Anderson	-	27	42
Bedford	-	33	13
Bloomington	10	--	21
Columbus	-	43	12
Evansville	-	16,18,20	97
Fort Wayne	-	25,38	118
Gary	-	48(c)	112
Indianapolis	6,8,12	45	387
Kokomo	-	23	34
LaFayette	-	37	29
Logansport	-	21	20
Marion	-	18	27
Muncie	-	[illegible]	50
Richmond	-	41	35
Seymour	-	[illegible]	9
South Bend	-	40,46	101
Terre Haute	-	28,38	63
Tell City	3	--	5
Vincennes	-	14	18

PROPOSED

K A N S A S

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Anthony	-	39	3
Arkansas City	-	37	13
Atchison	-	18	13
Baxter Springs	-	38	5
Belleville	-	27	3
Clay Center	-	38	5
Coffeyville	-	44	17
Colby	-	26	2
Concordia	-	34	6
Dodge City	-	24,43	8
El Dorado	-	16	10
Emporia	-	21	13
Ft. Scott	-	32	11
Garden City	9,11	-	6
Goodland	-	28	3
Great Bend	5	14	9
Hays	-	22	6
Hutchinson	-	30	30
Iola	-	41	12
Junction City	8	-	9
Kansas City (see Kansas City, Mo.)		-	-
Kinsley	-	41,45	2
Larned	-	30	4
Lawrence	-	39	14
Liberal	-	38	4
Lindsborg	-	42	2
McPherson	-	28	1
Manhatten	-	15	12
Newton	-	31	11
Norton	-	36	3
Oberlin	-	33	2
Osawatomie	-	24	5
Osborne	-	17	2
Ottawa	-	26	10
Phillipsburg	-	44	2
Pittsburg	-	30	18
Pratt	-	18	7
Russell	-	32	5
Salina	-	40	21
Scott City	-	31	2
Sharon Springs	-	21	1
Syracuse	-	29	1
Topeka	11,13	-	68
Wellington	-	33	7
Winfield	-	35	10
Wichita	3,10,12	-	115

PROPOSED

KENTUCKY

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Ashland (see West Virginia)			
Bowling Green	-	34	15
Corbin	-	45	8
Danville	-	38	7
Frankfort	-	15	11
Glasgow	-	40	6
Hazard	-	23	7
Henderson	-	41	13
Hopkinsville	-	36	12
Lexington	-	19	49
Louisville	5,9	29,31	434
Madisonville	-	25	8
Mayfield	-	17	9
Maysville	-	39	7
Middlesborough	-	41	12
Murray	-	[illegible]	4
Owensboro	-	[illegible]	30
Paducah	12	-	34
Richmond	-	21	7
Somerset	-	35	6
Winchester	-	42	9
Van Cleve	-	28	.75

LOUISIANA

Abbeville	-	28	7
Alexandria	5,11,13	-	27
Bastrop	-	23	7
Baton Rouge	-	43,45	35
Bogalusa	-	26	15
Crowley	-	18	10
DeRidder	-	29	4
Eunice	-	38	5
Hammond	-	14	6
Houma	-	24	9
Jennings	-	31	7
Lafayette	-	41	19
Lake Charles	-	23	21
Minden	-	14	7
Monroe	-	32,39	28
Natchitoches	-	24	7
New Iberia	-	34	14
New Orleans	2,4,5,7,10	--	540
Oakdale	-	19	4
Opelousas	-	15	9
Pineville	-	21	4
Ruston	-	16	7
Shreveport	3,10,12	--	112
Tallulah	-	30	6
Thibodeux	-	32	6
Winnfield	-	36	5

PROPOSED

M A I N E

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Augusta	8,10	19,21,23	19
Bangor-Old Town	5,12	36,42	37
Biddeford-Saco	-	14,16	28
Brunswick	-	44	7
Calais	2,7	14,16,18	5
Ft. Kent-St. Francis	8	15,17,19,21	6
Houlton	-	25,27,29	7
Lewiston-Auburn	-	28,30	58
Portland	6,13	-	106
Presque Isle	-	31,33,35	17
Waterville	-	32,34	16

M A R Y L A N D

Annapolis	-	49(c)	13
Baltimore	2,11,13	11,16	1,047
Cumberland	-	39,44	39
Hagerstown	-	35	33
Salisbury	-	43	13
Frederick	-	37	16

PROPOSED

M A S S A C H U S E T T S

Barnstable-W. Yarmouth	-	37	8
Boston	2,4,5,7	-	771
Brockton	-	48(c)	62
Fall River-New Bedford	-	19,21,23	225
Lawrence-Lowell-Haverhill	-	25,27	232
Pittsfield	-	28	50
Springfield-Holyoke	-	36,38	150
Worcester	-	43,45	194

M I C H I G A N

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Alpena	-	39	13
Ann Arbor	-	37	30
Battle Creek	-	29	43
Benton Harbor	-	44	17
Cadillac	-	23	10
Cheboygan/Mackinaw	4	-	6
Detroit	2,4,7	24,27	2,296
Escanaba	-	25	15
Flint	-	14,16,34	189
Gladstone	13	-	5
Grand Rapids	7,12	33,35	210
Hancock	-	16	6
Harbor Beach	-	[illegible]	2
Holland	-	[illegible]	15
Houghton	-	27	4
Iron Mountain	7,9	32,[illegible]	11
Iron River	-	[illegible]	4
Ironwood	-	30	13
Ishpeming	-	20	9
Jackson	-	20,22	50
Kalamazoo	[illegible]	15	77
Lansing	[illegible]	25	110
Ludington	-	30	9
Manastique	-	15	5
Manistee	-	27	9
Marquette	3,5,10	18	16
Midland	-	28	10
Muskegan	-	17,19	48
Petoskey	-	29,31	6
Pontiac	-	48(c)	67
Port Huron	-	46(c)	33
Rogers City	-	42	3
Saginaw - Bay City	-	18,21,32	153
Sault St. Marie	8,10	14,16	16
Tawas City	-	25	1
Traverse City	-	41,43	14
West Branch	-	36	2
			73

PROPOSED

-18-

M I N N E S O T A

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Albert Lea	0	24	12
Alexandria	0	29	5
Austin	0	16	18
Bemidji	0	22	9
Brainerd	0	43	12
Chisholm	0	44	7
Crookston	0	20	7
Detroit Lakes	0	27	5
Duluth/ Superior (see Wisconsin)			157
Ely	0	18	7
Eveleth	0	37	7
Fairmont	0	26	7
Faribault	0	21	15
Fergus Falls	0	33	11
Grand Rapids	0	36	5
Hastings	0	40	6
Hibbing	0	39,41	16
International Falls	0	14,16	6
Little Falls	0	25	6
Mankato	0	44	16
Marshall	0	20	5
Minneapolis-St. Paul	2,4,5,7,9,11,13	0	911
Montevideo	0	36	5
Moorhead (see Fargo)			
New Ulm	0	28	9
Northfield	0	14	5
Owatonna	0	42	9
Pine City	0	31	2
Red Wing	0	18	10
Rochester	0	32,34	26
St. Cloud	0	17,19	24
Thief River Falls	0	24	6
Virginia	0	21	12
Wadena	0	32	3
Willmar	0	15	8
Winona	0	38	22
Worthington	0	23	6

PROPOSED

-19-

M I S S I S S I P P I

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Aberdeen	0	15	5
Biloxi	0	31,33	17
Brookshaven	0	18	6
Canton	0	24	6
Clarksdale	0	29,31	12
Columbia	0	29	6
Columbus	0	25	14
Greenville	0	43,45	21
Greenwood	0	21	15
Grenada	0	17	6
Gulfport	0	21,23	15
Hattiesburg	0	40,42	21
Jackson	3,9,12	6	88
Laurel	0	16	21
Kosciusko	0	19	4
McComb	0	20,23	10
Macon	2	0	2
Meridian	0	36,38	35
Natchez	0	25,27	15
Pascagoula	0	28	6
Philadelphia	0	34	4
Picayune	0	44	5
Starkville	0	28	5
Tupelo	0	22	8
Vicksburg	0	35,37	24
West Point	0	32	6
Yazoo City	0	41	7

PROPOSED

-20-

M I S S O U R I

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Cape Girardeau	-	45	19
Carrollton	-	40	4
Carthage	-	25	11
Chillicothe	-	44	8
Clinton	-	20	6
Columbia	-	15	18
De Sota	2	-	5
Flat River	-	31	65
Fulton	-	33	8
Hannibal	-	25	21
Hermitage	-	23	0.3
Jefferson City	6	43	24
Joplin	-	19,22	37
Kansas City	2,4,5,9	--	399
Lebanon	--	27	5
Lexington	--	31	5
Louisiana	-	39	5
Marshall	-	17	9
Maryville	-	30	6
Mexico	-	22	9
Moberly	-	36	13
Nevada	-	34	8
Popular Bluff	-	21	11
Rolla	-	35	5
St. Joseph	-	35,37	76
St. Louis	4,5,7,9,11,13	--	816
Salem	-	14	3
Sedalia	-	29	20
Sikeston	-	26	8
Springfield	3,10,12	--	61
Van Buren	-	38	0.5
Washington	-	19	7
West Plains	-	41	4

PROPOSED

-21-

MONTANA

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Anaconda	-	35,37	11
Baker	-	19	1
Big Timber	-	24	2
Billings	2,4,5,7	19,21	23
Bozeman	-	14,16	9
Broadus	-	29	0.6
Butte	2,4,5,7	33,40	37
Chester	-	30	0.5
Chinook	-	25	2
Chouteau	-	18	1
Circle	-	28	0.7
Cut Bank	-	43,45	3
Dillion	-	27	3
Ekalaka	-	26	0.7
Forsyth	-	38,39	2
Fort Benton	-	36,38	2
Glasgow	-	18,20,22	4
Glendive	-	21	5
Great Falls	3,6,8	26,28	30
Hamilton	-	24	2
Harlowton	-	44	2
Havre	9,11	19,21,23	6
Hardin	2	41,43	2
Helena	10,12	-	15
Hysham	-	37	0.4
Jordan	-	30	0.7
Kalispell	-	15	8
Lewistown	-	17	6
Libby	-	35,37	2
Livingston	-	32,34	7
Malta	-	27	2
Miles City	3,6,10	14,16,24	7
Missoula	11,13	17,19	18
Paradise	-	42	0.35
Philipsburg	-	29	1
Plentywood	-	29,31,44	2
Polson	-	27	2
Red Lodge	-	29	3
Roundup	-	35	3
Saco	-	45	0.5
Scobey	-	41	1
Shelby	-	14,16	3
Sidney	-	15,17	3
Stanford	-	15	1
Thompson Falls	-	25	0.7
Virginia City	-	45	0.4
Whitehall	-	22	1
White Sulphur Springs	-	20	1
Wibaux	-	40	0.6
Winifred	-	41	0.3
Winnett	-	42	0.4
Wolf Point	-	33	2
			77

PROPOSED

NEBRASKA

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Ainsworth	-	38	2
Alliance	-	15,37	6
Atkinson	-	34	1
Bayard	-	42	2
Beatrice	-	45	11
Bridgeport	-	40	2
Broken Bow	-	16	3
Columbus	-	26	8
Crawford	-	22	2
Fairbury	-	43	6
Falls City	-	33	6
Fremont	-	36	12
Gothenburg	-	14	1
Grand Island	-	35,37	19
Hastings	4	10,41	15
Holdrige	-	8	3
Kearney	-	21,23	10
Lexington	-	18	4
Lincoln	10,12	-	82
McCook	8,13	-	6
Nebraska City	-	14	7
Neligh	-	17	2
Norfolk	-	15	10
North Platte	2,5	-	12
Ogallala	-	24	3
Omaha	3,6,7	-	224
O'Neill	-	20	3
Ord	-	30	2
Scottsbluff	-	18,20	12
Seward	-	24	3
Sidney	-	32	3
Stanton	-	22	2
Superior	-	29	3
Valentine	-	28	2
West Point	-	44	3
York	-	19	5

PROPOSED

-23-

N E V A D A

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Austin	-	29	0.5
Battle Mountain	-	42	0.8
Boulder City	-	18,22	3
Caliente	-	28,30,43	1
Carson City	-	30	2
Elko	10	15,17,19	4
Ely	3,6	14,16,20	4
Eureka	-	40	0.6
Fallon	-	35	2
Gerloch	-	28	0.1
Goldfield	-	44	0.6
Henderson	-	27,32	7
Las Vegas	8,10,12	14,16,41,45	8
Lovelock	-	25	1
McDermitt	-	26	0.2
McGill	-	23,25	3
Mina	-	39	0.4
Mountain City	-	34	0.9
Overton	-	34,36	1
Palisade	-	45	0.1
Pioche	-	24,26	1
Reno	3,13	14,16	21
Sparks	-	37	5
Tonopah	-	18,21	2
Wells	-	41	0.8
Winnemucca	-	18,21	2
Yerington	-	23	1

N E W H A M P S H I R E

Berlin	-	26	19
Concord	-	31,33	27
Laconia	-	35	13
Littleton-Bethlehem	-	40	5
Manchester	9	29	81
Portsmouth	-	39,41	14

N E W J E R S E Y

Asbury Park	-	46(c)	15
Atlantic City	-	23,25,27	100
Newark	13	0	430
New Brunswick	-	48(c)	38
Trenton	-	15,17,41	125
Vineland	-	39	8

PROPOSED

-24-

NEW MEXICO

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Alamogordo	-	19,21	4
Albuquerque	2,4,5,7	-	35
Artesia	-	26,28	4
Belen	-	22,24	3
Bernalillo	-	20	2
Carlsbad	10	22,24	7
Carrizoza	-	42	1
Chama	-	43	0.7
Clayton	-	27	3
Clovis	12	14,16	10
Dawson	-	41	2
Deming	-	23,25	4
Farmington	-	21	2
Ft. Sumner	-	43	2
Gallup	3,10	17,19	7
Hachita	-	[illegible]	0.8
Hobbs	-	[illegible]17	11
Hot Springs	-	[illegible]	3
Laguna	-	[illegible]	0.5
Lordsburg	-	43,45	3
Los Alamos	-	34	1
Las Cruces	-	27,29	8
Las Vegas	-	17	6
Lovington	-	30	2
Magdalena	-	35	1
Park View	-	36	5
Portales	-	18,20	0.8
Raton	-	35,37	8
Roswell	3,6,8	34,36	13
Roy	-	44	1
San Rita	-	20	3
Santa Fe	9,11,13	30,32	20
Santa Rosa	-	25	2
Silver City	12	18	5
Socorro	-	14,16	4
Taos	-	15	1
Tucumcari	-	29,31	6
Vaughn	-	45	1
Willard	-	39	0.5

PROPOSED

-25-

NEW YORK

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Albany-Schenectady-Troy	4	42,44	432
Auburn	-	18	36
Batavia	-	36	17
Binghamton	12	23,25	145
Buffalo - Niagara	2,4,7	27	857
Dunkirk	-	31	18
Elmira - Corning	-	14,16	61
Hornell	-	39	17
Ithaca	-	37	20
Jamestown	-	17	43
Malone	-	30	9
Massena	-	21	11
Middletown	-	35	22
New York City/Northeastern N.J.	2,4,5,7,9,11	-	11,691
Ogdensburg	-	34	16
Olean	-	18	22
Oneonta	-	43	12
Oswego	-	28	22
Plattsburg	-	32	16
Poughkeepsie	-	40	40
Rochester 2/	5	22,32,44	412
Saranac Lake	-	39	7
Syracuse 3/	3,8,10	-	258
Tupper Lake	-	19	5
Utica - Rome	13	33	197
Watertown	-	41,43	33

PROPOSED

2/ See paragraphs 6, 7 & 9 of the Notice of Further Proposed Rule Making to which this appendix is attached.

3/ See paragraphs 6, 7 & 8 of the Notice of Proposed Rule Making to which this appendix is attached.

NORTH CAROLINA

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Ahoski	0	39	2
Asheville	0	14,18	51
Belhaven	0	20	2
Charlotte	3,9,11	0	101
Durham	0	33,35	60
Elizabeth City	0	31	12
Fayetteville	0	38,40	17
Gastonia	0	42	21
Goldsboro	0	26	17
Greensboro	2	41,43,45	59
Greenville	0	36	13
Henderson	0	18	8
Hendersonville	0	20	8
Hickory	0	34	13
High Point	0	23,25	38
Jacksonville	0	28	1
Kannapolis	0	79	25
Kinston	0	46	15
Lenoir	0	36	8
Morehead City	0	45	4
New Bern	0	32	12
Raleigh	0	28,30	47
Rocky Mount	0	24	26
Salisbury	0	21	19
Shelby	0	44	14
Wilmington	5	14,16	33
Wilson	0	44	19
Winston Salem	6,13	17	80
Washington	0	34	9

PROPOSED

-27-

NORTH DAKOTA

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Ashley	-	36	1
Bismarck	5,7,12	20,22	15
Botteneau	-	32	2
Bowman	-	43,45	1
Carrington	-	17	1
Cooperstown	-	28	1
Crosby	-	36,38	1
Devils Lake	-	19	6
Dickinson	2,4,9	-	6
Fargo	6,10,13	14,16,18	33
Ft. Yates	-	29	1
Grafton	-	26,30	4
Grand Forks	2,4,8	33,35,39	20
Harvey	-	44	2
Hettinger	-	32,34	1
Jamestown	-	[illegible]	9
Kenmore	-	[illegible]	2
Langdon	-	[illegible]	2
Larimore	-	49	1
Mandan	-	33,35,37	7
Minot	3,6,10	16,18	17
Napoleon	-	27	1
New Rockford	-	15	2
Oakes	-	40,42	2
Rolla	-	23	1
Rugby	-	21	2
Stanley	-	42	1
Stanton	-	14	4
Valley City	-	31	6
Wahpeton	-	34	4
Williston	8,11	23,25,27	6

PROPOSED

O H I O

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Akron	-	25,36,38	349
Canton	-	32,34	200
Chilicothe	-	37	20
Cincinnati	4,7,11	22,24	789
Cleveland /4	4,5,8,11	40,42	1,214
Columbus	3,6,10	-	365
Dayton	5,13	14,16	271
Gallipolis	-	27	7
Hamilton-Middletown	2	34	112
Lima	-	28,30	44
Mansfield	-	21,23	37
Marion	-	33,35	30
Newark	-	29	31
Portsmouth	-	18,20	40
Sandusky-Fremont	-	17	25
Springfield	-	38,44	77
Steubenville	-	[illegible]	37
Toledo	13	[illegible]	341
Youngstown	-	14,26,18	372
Zanesville	-	15	37

PROPOSED

/4 See paragraphs 6, 7 and 10 of the Notice of Further Proposed Rule Making to which this Appendix C is attached.

OKLAHOMA

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Ada	-	20	15
Altus	-	16	9
Alva	-	23	5
Ardmore	-	32	17
Bartlesville	-	14	16
Beaver	-	36	1
Boise City	-	30	1
Chickasha	-	45	14
Clinton	-	31	7
Duncan	-	35	9
Durant	-	40	10
Elk City	-	14	5
El Reno	-	22	10
Enid	13	15	28
Frederick	-	27	5
Guthrie	-	[illegible]	10
Guymon	-	[illegible]	2
Hobart	-	[illegible]	2
Hugo	-	[illegible]	6
Lawton	10	18	18
Miami	[illegible]	36	8
Muskogee	8	23	32
McAlester	-	34	12
Norman	-	41	11
Okeene	-	29	4
Oklahoma City	4,7,9	-	221
Okmulgee	-	28	16
Ponca City	-	27	17
Seminole	-	43	12
Shattuck Jnc.	-	40	1
Shawnee	-	30	22
Stillwater	-	17	10
Tulsa	2,6,11	-	189
Woodward	-	45	5

PROPOSED

OREGON

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Albany	-	25	6
Ashland	-	19,21	5
Astoria	-	26	10
Baker	-	16	9
Bend	-	28,35	10
Burns	-	21,42	3
Canyon City	-	14	0.3
Coquille	-	24,26	3
Condon	-	22	1
Corvallis	-	23	8
Enterprise	-	40	2
Eugene	-	14,16	21
Gold Beach	-	40	.5
Grants Pass	-	36,38	6
Heppner	-	41,43	1
Hood River	-	26	3
Kinzua	-	18	0.8
Klamath Falls	2,4	32,34	16
La Grande	3,13	-	8
Lakeview	-	20,27,29	2
McMinnville	-	44	4
Madras	-	39	0.4
Marshfield (Coos Bay)	-	22,29	5
Medford	5,7	15,17	11
Newport	-	42	2
Ontario	-	20	4
Pendleton	-	24	9
Portland	3,6,8,10,12	17	406
Pineville	-	30	2
Redmond	-	45	2
Reedsport	-	18	1
Roseburg	-	31,33	5
Salem	-	32,34	31
Sprague River	-	41,43	6
The Dalles	-	27	6
Tillamook	-	19,21	3
Westfir	-	37	0.8

PROPOSED

PENNSYLVANIA

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Altoona	0	15	114
DuBois	0	43	12
Easton-Allentown-Beth.	0	19,21	325
Emporium	0	33	4
Erie	12	45	134
Greensburg	0	48	17
Harrisburg	0	22,42	173
Hazelton	0	38	38
Johnstown	6,13	21	152
Lancaster /2	4	26,28	132
Lebanon	0	24	27
Lewistown	0	40	13
Meadville	0	47	19
New Castle	0	30	48
Philadelphia	3,6,10	44	2,899
Pittsburgh	3,9	24,26	1,994
Reading	0	33,36	175
Scranton-Wilkes Barre	0	34,45	630
Uniontown	0	46	22
Williamsport	0	29	44
York	0	18,20	93

RHODE ISLAND

Providence	11	15,17	712

SOUTH CAROLINA

Anderson	0	33	19
Barnwell	0	25	2
Bennettsville	0	15	5
Charleston	2,8,13	28,30	71
Columbia	4,7,10	39	62
Florence	0	27	16
Georgetown	0	18	6
Greenville	0	38,40	35
Greenwood	0	31	13
Myrtle Beach	0	37	2
Orangeburg	0	45	11
Rockhill	0	29	15
Seneca	0	35	2
Spartanburg	0	22,24	32
Sumter	0	32	16
Walterboro	0	34	3

/2 See asterisk footnote to Section III - F - 1 in Appendix A which is part of the notice of Further Proposed Rule Making herein.

SOUTH DAKOTA

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Aberdeen	3,9	26,30	17
Belle Fourche	-	20	3
Brookings	-	41,43,45	5
Buffalo	-	30	0.5
Chamberlin	-	23	2
Custer	-	16	2
Deadwood	-	35	4
Dupree	-	17	0.5
Edgemont	-	39,41	2
Gettysburg	-	19	1
Hot Springs	-	33	3
Huron	-	32,35	11
Lake Andes	-	27	0.8
Lead	-	27	8
Madison	-	37,39	5
Martin	-	[illegible]	1
Mobridge	-	39,41	3
Miller	-	[illegible]	1
Mitchell	4,8	-	11
McIntosh	-	24	0.6
Phillip	-	14	0.8
Pierre	6,10	-	1
Pine Ridge	-	43,45	2
Rapid City	7,12	-	14
Sioux Falls	11,13	14,16,18	41
Sisseton	-	44	2
Vermillion	-	31,33	3
Watertown	-	22,24	11
White River	-	21	0.6
Winner	-	42,44	2
Yankton	-	25,29	7

PROPOSED

TENNESSEE

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Bristol	0	26	14
Chattanooga	3,9,12	0	193
Clarksville	0	42	12
Cleveland	0	30	11
Columbia	0	21	11
Cookeville	0	37	4
Dyersburg	0	30	10
Fayetteville	0	16	5
Harriman	0	17	6
Humboldt	0	35	5
Jackson	0	24	24
Johnson City	0	16	25
Knoxville	6,10,13	0	152
Lebanon	0	27	6
Lewisburg	0	29	4
Lexington	5	0	3
Memphis	4,6,8,10,13	0	332
Morristown	0	4	8
Murfreesboro	0	14	9
Nashville	2,4,7,11	0	242
Paris	0	19	6
Pulaski	0	38	5
Shelbyville	0	31	7
Springfield	0	23	7
Tullahoma	0	33	5
Union City	0	28	7
Winchester	0	18	3

PROPOSED

TEXAS

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Abilene	9	24	27
Alice	0	19	8
Alpine	12	0	4
Amarillo	2,4,5,7,10	0	53
Athens	0	41	5
Austin	0	26,28,30	106
Ballinger	0	36	4
Bay City	0	16,40	7
Beaumont/ Port Arthur	4,6	26,33,39	139
Beeville	0	25	7
Big Spring	0	25	13
Borger	0	15	10
Brackittville	0	29	3
Brady	0	19	5
Breckenridge	0	17	6
Brenham	0	19	6
Brownfield	0	37	4
Brownville	4,5,9	0	22
Brownwood	0	21	13
Bryan	0	14	12
Cameron	0	32	5
Canadian	0	28	2
Canyon	0	32	3
Center	0	40	3
Childress	0	19	6
Clarendon	0	26	2
Cleburne	0	44	11
Coleman	0	43	6
Colorado City	0	18	5
Corpus Christi	6,10	31,33	71
Cotulla	0	32	4
Crockett	0	22	5
Crystal City	0	24	7
Cuero	0	20	5
Dalhart	0	22	5
Dallas	4,8,12	0	377
Del Rio	0	18	13
Denton	0	36	11
Dumas	0	45	2
Eagle Lake	0	29	2
Eagle Pass	0	16	6
Edinburg	0	21	9
El Campo	0	38	4
Eldorado	0	33	2
El Paso	2,4,5,7,9	41,44	116

PROPOSED

TEXAS (CONTD)

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Falfurrias	-	23	6
Ft. Davis	-	14	1
Ft. Stockton	-	31	3
Ft. Worth	2,5,10	--	208
Fredericksburg	-	22	4
Galveston	-	21,24	72
Graham	-	15	5
Greenville	-	24	14
Gonzales	-	15	5
Hamilton	-	39	3
Hamlin	-	28	2
Harlingen	-	14	13
Haskell	-	30	3
Henrietta	-	23	2
Hereford	-	42	3
Hillsboro	-	35	8
Houston	2,8,11,13	--	510
Huntsville	-	47	5
Jacksonville	-	19	7
Jasper	9	--	3
Junction	-	27	2
Kermit	-	38	3
Kerrville	-	17,31	6
Kilgore	-	43	7
Kingsville	-	17	8
La Grange	-	43	3
Lamesa	-	41	6
Lampassas	-	35	3
Laredo	3,8	--	39
Liberty	-	44	3
Livingston	-	42	2
Littlefield	-	39	4
Longview	-	30	14
Lubbock	11,13	33,35	32
Lufkin	-	35	10
Marfa	-	20,25	4
Marshall	-	37	18
Mexia	-	34	6
McAllen	-	26	12
Midland	-	29	9
Mineola	-	21	3
Mineral Wells	-	42	6
Monahans	4	19	4
Mount Pleasant	-	33	5
Nocogdoches	-	28	8

PROPOSED

T E X A S (CONTD)

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Orange	-	18	7
Odessa	7	21	10
Ozona	-	45	2
Palestine	7	-	12
Paris	-	19	13
Pampa	-	17	19
Pearsall	-	34	3
Pecos	-	27	5
Perryton	-	34	2
Plainview	-	23	8
Presido	-	16	1
Rankin	-	42	0.5
Rio Grande	-	29	3
Robstown	-	27	7
Rock Springs	-	20	1
Rosenberg	-	36	3
Sabinal	-	44	2
Sanderson	-	23	25
San Angelo	2,6	-	26
San Antonio	4,5,7,9,12	-	319
San Benito	-	34	40
San Diego	-	37	3
San Marcos	-	45	6
Shamrock	-	28	3
Sequin	-	41	7
Sherman	-	14	17
Seymour	-	34	3
Sierra Blanca	-	32	1
Snyder	-	22	4
Sonora	-	15	3
Spur	-	44	2
Stanford	-	20,40	5
Stephenville	-	29	5
Sterling City	-	16	1
Sulphur Spring	-	26	7
Sweetwater	12	14,32	10
Taylor	-	23	8
Temple	-	37	15
Terrell	-	38	19
Texarkana (see Arkansas)			
Tyler	-	45	28
Uvalde	-	14	7
Van Horn	-	18	1
Vernon	-	38	9
Victoria	-	18	12
Waco	-	16,18	71
Waxahachie	-	31	9
Wichita Falls	3,6	--	45
Weslaco	-	42	7

PROPOSED

-37-

U T A H

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Beaver	-	19	2
Brigham	-	42	6
Castle Dale	-	14	1
Cedar City	5	17	5
Duchesne	-	31	1
Ephraim	-	28	2
Escalante	-	25	1
Fillmore	-	37	2
Green River	-	43	0.5
Heber	-	16	3
Hurricane	-	21	2
Hyrum	-	20	2
Kanab	-	44	1
Lehi	-	44	3
Loa	-	45	0.4
Logan	-	30,32	12
Milford	-	33	1
Moab	-	26	1
Monticello	-	23	0.7
Nephi	-	18	3
Ogden	12	34,38,40	44
Panquitch	-	42	2
Parowan	-	15	1
Price	11,13	-	5
Provo	-	21,24	18
Richfield	-	22	4
St. George	-	38	4
Salina	-	35	2
Salt Lake City	2,4,5,7,9	-	204
Tooele	-	27	5
Vernal	-	33	2

PROPOSED

VERMONT

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Brattleboro	-	18	10
Burlington	-	15,17	28
Montpelier	3	20,22	8
Newport	-	38	5
Rutland	-	37	17
St. Albans	-	24	8

VIRGINIA

Charlottesville	-	32	19
Covington	-	29	6
Danville	-	27	33
Emporia	-	27	3
Fredericksburg	-	44,45	10
Harrisonburg	-	30	8
Lexington	-	42	4
Lynchburg	-	14,16	51
Martinsville	-	31	10
Norfolk-Portsmouth-Newport News	4,10,12	25,29	191
Norton	-	32	4
Petersburg	-	21	31
Pulaski	-	39	9
Richmond	3,6,8	15,17,19	193
Roanoke	7,10	20,22	69
Staunton	-	34	13
Suffolk	-	23	11
Waynesboro	-	38	7
Winchester	-	25	12

PROPOSED

-39-

WASHINGTON

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Aberdeen	-	22	19
Bellingham	-	21,23	29
Bremerton	-	39,41	15
Centralia	-	24	7
Chehalis	-	28	5
Colville	-	45	2
Colfax	-	28	3
Ellensburg	-	42	6
Ephrata	-	17	1
Everett	-	43,45	30
Goldendale	-	29	2
Grand Coulee	-	27	4
Kennewick	-	26	2
Longview	-	40	12
Metaline Falls	-	29	0.5
Moses Lake	-	[illegible]	0.3
Mt. Vernon	-	[illegible]	4
Olympia	-	[illegible]	13
Omak	-	[illegible]	3
Oroville	-	32	1
Pasco	-	19	4
Port Angeles	-	32,34	9
Pullman	-	30	4
Puyallup	-	20	8
Republic	-	40	.9
Ritzville	-	23	2
Seattle	4,5,7,11	14,16	453
Sheldon	-	30	4
Spokane	2,4,5,7	-	141
Sunnyside	-	15	2
Tacoma	9,13	-	156
Vancouver	-	38	19
Walla Walla	6,8,10	38	18
Waterville	-	35	0.9
Wenatchee	-	37	12
Yakima	-	31,33	27

PROPOSED

WEST VIRGINIA

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Beckley	4	-	13
Bluefield	-	15	21
Clarksburg	-	17	31
Charleston	8,12	30,40	68
Elkins	-	23	8
Fairmont	-	31	23
Hinton	-	24	6
Huntington - Ashland	5	25	79
Martinsburg	-	27	15
Montgomery	-	34	3
Parkersburg	-	43,45	30
Sutton	-	33	1
Weston	-	19	8
Wheeling	7	28,41	61

WISCONSIN

Antigo	-	22	9
Appleton	-	28	28
Ashland	-	42	11
Beloit	-	18	25
Eau Clair	-	27,29	31
Fond du Lac	-	21	27
Green Bay	-	40,42	46
Hayward	-	36	6
Janesville	-	39	23
Kenosha-Racine	-	32,34;36	116
Ladysmith	-	45	4
La Crosse	-	41,43	43
Madison	-	14,23,25	67
Marshfield	-	35	10
Medford	-	15	2
Merrill	-	19	9
Milwaukee	3,6,8,10	-	587
Praire du Chien	-	30	4
Rice Lake	-	23	6
Rhinelander	-	39	9
Oshkosh	-	16,31	39
Shawano	-	44	6
Sheboygan	-	38	41
Sparta	-	17	6
Stevens Point	-	24,26	16
Superior-Duluth	3,6,8,10,12	-	136
Whitehall	-	20	1
Warsau	-	37	27
Wisconsin Rapids	-	33	11

PROPOSED

W Y O M I N G

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Basin	-	38	1
Buffalo	-	22	2
Casper	3,6,8	24	18
Cheyenne	11,13	14,16	28
Cody	-	23,25	3
Douglas	-	36	2
Evanston	-	36	4
Gillette	-	40	2
Green River	-	41	3
Hanna	-	15	1
Jackson	-	44	1
Kemmerer	-	23	2
Lander	-	16	3
Laramie	-	19,21	11
Lusk	-	26	2
Midwest	-	32,34	1
Newcastle	-	[illegible]	2
Pinedale	-	[illegible]	0.6
Powell	-	[illegible]	2
Rawlins	-	17	6
Rock Springs	-	25	10
Riverton	10	18,20	3
Sheridan	9,12,13	15,17	11
Sudance	-	25	0.7
Superior	-	29	1
Thermopolis	-	45	2
Torington	-	44	2
Wheatland	-	28,30	2
Worland	-	31,33	3

PROPOSED

U. S. TERRITORIES

A L A S K A

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Anchorage	2,7,11,13	-	3
Fairbanks	2,4,7,9,11,13	-	3
Juneau	3,8,10	-	6
Ketchikan	2,4,9	-	5
Seward	4,9	-	1

P U E R T O R I C O

San Juan	7,9,11,13	-	169
Mayaguez	2,4		50

V I R G I N I S L A N D S

	3	-	25

PROPOSED

H A W A I I A N I S L A N D S

Lihue, Kauai	3,8,10,12	-	4
Honolulu, Oahu	2,4,7,9,11,13	-	179
Wailuku, Maui	3,8,10,12	-	7
Hilo, Hawaii	2,4,7,9,11,13	-	23

APPENDIX D

As pointed out in paragraph 6 of the Notice of Further Proposed Rule Making, the channel allocations for Canada, Mexico, and Cuba, are set forth only for illustrative purposes and to show the effect on the proposed United States Allocation Table of assignments which might be made in Canada, Mexico and Cuba.

CANADA

ALBERTA

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Calgary	2,4,10,12	14,16,18,27	80
Lacombe	8	29	2
Lethbridge	7	20,24	15
Medicine Hat	5	15,17	11
Red Deer	-	25	3

BRITISH COLUMBIA

Chilliwack	12	38	4
Cranbrook	-	17	3
Fernie	-	21	3
Kamloops	4	42	5
Kelowna	13	36	5
Nelson	6	38	6
Penticton	-	18	5
Port Alberni	-	42	5
Prince Rupert	3,7	-	-
Trail	11	14	9
Vancouver-New Westminster	6,8,10	15,17,29,40,44	297
Vernon	2	42	5
Victoria	2	27,36	44

MANITOBA

Brandon	5,9,11	37,40	17
Portage la Prairie	-	14	-
Winnipeg - St. Boniface	3,6,7,13	16,18,34,36,38	222

PROPOSED

NEW BRUNSWICK

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Campbellton	12	18	7
Edmundston	10	37	7
Fredericton	9	20	10
Moncton	0	17	23
New Castle	0	38	4
St. John	4,6	26,28	52
St. Stephen	0	22	3
Sackville	8	19	2
Woodstock	0	40	4

NOVA SCOTIA

Amherst	0	36	9
Antigonish	9	16	2
Bridgewater	10	33	3
Halifax	3,5,12	27,29,31,39	70
Kentville	0	21	4
Sydner	0	18,20	28
Truro	8	25	10
Windsor	6	23	3
Yarmouth	11	24	8

PROPOSED

ONTARIO

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Belleville	0	28	16
Brantford-Simcoe	0	20	38
Brockville	0	45	11
Chatham	0	19	17
Cornwall	0	36	14
Fort Frances	5	28	6
Guelph-Kitchener-Galt	0	37	74
Haileybury	0	21	2
Hamilton	6	29,15	166
Kenora	9	19	8
Kingston	0	26	30
Kirkland Lake	3	16	20
London-St. Thomas	10	35	95
North Bay	2	27	16
Oshawa	0	24	29
Orillia Junction	3	14	20
Ottawa-Hull	7,9,11	14,16	155
Owen Sound	8	30	14
Pembrooke	4	31	11
Peterborough	0	38	25
Port Arthur-Fort William	2,4	19,22,24	24
St. Catherine-Niagara Falls	0	34	51
Sarnia	0	44	19
Sault Ste, Marie	2,12	22	26
Stratford	0	23	17
Sudbury	5,7	23,25	32
Timmons	6	19	29
Toronto	9,11,13	42,40	667
Windsor	9	31,41	105
Wingham	0	33	2
Woodstock	0	26	12

PRINCE EDWARD ISLAND

Charlottetown	13	14	15
Summerside	11	21	5

PROPOSED

-4-

QUEBEC

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
Amos	0	20	3
Chicoutimi	2,12	20	16
Granby	0	27	14
Hull Ottawa	0	14,16	33
Jonquiere	0	22	14
Matane	0	14	5
Montreal	2,5,8,10,12	42,44	903
New Carlisle	2	16	0
Quebec	4,6,7,9,11	14,16	151
Riviere duLoup	5	26	9
Rimouski	3	23	7
Roberval	0	27	3
Rouyn	0	14	4
St. Hyacinthe-Drummondville	0	29	18
Ste. Anne de la Pocatiere	13	24	1
Shawinigan Falls	0	25	20
Sherbrooke	0	43,45	36
Sorel	0	36	12
Three Rivers	0	23	42
Val d' Or	0	18	0

PROPOSED

SASKATCHEWAN

Moose Jaw	4,7	14,16	21
North Battleford	12	22	5
Prince Albert	0	25	13
Regina	2,5,9	21,24,26,35	58
Saskatoon	6,8	15,20	43
Swift Current	0	28	16
Waterous	11	18	1
Yorkton	12	17	6

-5-

M E X I C O

	VHF Channel No.	UHF Channel No.	Pop. in Thousands
BAJA CALIFORNIA			
Tijuana	10,12		
Mexicali	11,7		
SONORA			
Nogales	13		
Hermosillo	2		
Ciudad Obregon	3		
Navojo	5		
CHIHUAHUA			
Chihuahua	2		
Hidalgo del Parral	3		
Juarez	11,13		
COAHUILA			
Monclova	5		
Saltillo	4		
NUEVO LEON			
Monterrey	2,6,10,12		
TAMPAULIPAS			
Nuevo Laredo	11,13		
Matamoros	7		

PROPOSED

C U B A

Havana, Matanzas, Las Villas Provinces	3,6,7,9,11,13	

SEPARATE VIEWS OF COMMISSIONER HENNOCK
To Notice of Further Proposed Rule Making (FCC 49-948)

I believe that this Notice of Proposed Rule Making should include a provision for the reservation of a specified number of frequencies in the ultra-high frequency band for the establishment of a non-commercial educational television service. I do not believe it sufficient merely to invite suggestions regarding the possibility of making provision for such a service. For I think that our duty to "encourage the larger and more effective use of radio in the public interest" requires us to make an affirmative effort to make provision to insure that educators will be able to make full use of television, and to enter into the field before the spectrum becomes too crowded.

The rich opportunities afforded educators by television, especially with the growth of knowledge about the efficacy of visual education, should be obvious to all, especially in view of the outstanding results achieved by widespread use of visual education in the armed forces during the last war. It would, I think, result in tragic waste from the standpoint of the public interest if, at the outset of development in this field, adequate provision were not made for the realization of the almost limitless possibilities of television as a medium of visual education. Moreover, the present lack in many places of sufficient qualified teaching personnel makes television available as a vital force in achieving a raising of our educational standards.

I am not unaware of the substantial problem presented by the size of the investment presently required for the establishment of television stations. But this type of difficulty is one which has often been faced and overcome in this nation's history, and I am sure that with sufficient imagination and cooperation on the part of the broadcasting industry, the educational community, and other interested public service groups, and with encouragement by the FCC it will prove to be no lasting obstacle. I therefore believe that, from the outset, the Commission must take a vigorous and affirmative lead in ensuring that this great opportunity is fully realized.

PROPOSED

[fols. 107-108] EXHIBIT "B" TO COMPLAINT

54312-9/50
FCC 50-1064

FEDERAL COMMUNICATIONS COMMISSION
Washington 25, D. C.

In the Matters of

Docket Nos. 8736 and 8975

Amendment of Section 3.606 of the Commission's Rules and Regulations

Docket No. 9175

Amendment of the Commission's Rules, Regulations, and Engineering Standards Concerning the Television Broadcast Service

Docket No. 8976

Utilization of Frequencies in the Band 470 to 890 Mcs. for Television Broadcasting

First Report of Commission
(Color Television Issues)

By the Commission: Commissioners Hyde and Hennock writing separate views and Commissioner Jones dissenting in part.

Adopted: September 1, 1950.

Released: September 1, 1950.

[fol. 109] Table of Contents

Subject	*Paragraph No.*
I. Introductory	
A. General Description of Proceedings	1
B. Prior Consideration of Color Television by the Commission	7
C. Color Phase of Instant Proceedings	22

Subject	*Paragraph No.*
II. Description of the Three Systems	
A. General	26
B. The CTI System	36
C. The CBS System	41
D. The RCA System	45
III. Evaluation of the Three Systems	
A. General	54
B. Flicker, Motion Continuity, and Allied Effects	
1. General	55
2. The CTI System	62
3. The CBS System	65
4. The RCA System	69
C. Brightness-Contrast	
1. General	72
2. The CTI System	73
3. The CBS System	74
4. The RCA System	76
D. Superposition of Color Images	
1. General	77
2. The CTI System	79
3. The CBS System	81
4. The RCA System	83
E. Color Fidelity	
1. The CTI System	85
2. The CBS System	86
3. The RCA System	87
F. Resolution	
1. General	88
2. The CTI System	89
3. The CBS System	90
4. The RCA System	91
G. Picture Texture (Structural)	
1. General	92
2. The CTI System	93
3. The CBS System	94
4. The RCA System	97

Subject	*Paragraph No.*
[fol. 110]	
H. Susceptibility to Interference	
1. General	98
2. The CTI System	99
3. The CBS System	100
4. The RCA System	101
I. Adaptability and Convertibility	
1. General	102
2. The CTI System	104
3. The CBS System	105
4. The RCA System	107
J. Equipment Considerations	
1. The CTI System	108
2. The CBS System	111
3. The RCA System	115
IV. Conclusions	
A. General	120
B. The CTI System	127
C. The RCA System	132
D. The CBS System	140
List of Witnesses	Appendix A
List of Exhibits	Appendix B
Separate Views of Commission-Hyde	
Separate Views of Commission-Hennock	
Separate Opinion of Commission-Jones dissenting in part.	

[fol. 111] FEDERAL COMMUNICATIONS COMMISSION
Washington 25, D. C.

54312-8/50
FCC 50-1064

In the Matters of

Docket Nos. 8736 and 8975

Amendment of Section 3.606 of the Commission's Rules and Regulations

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Amendment of the Commission's Rules, Regulations, and Engineering Standards Concerning the Television Broadcast Service

Docket No. 8976

Utilization of Frequencies in the Band 470 to 890 Mcs. for Television Broadcasting

First Report of Commission
(Color Television Issues)

I. Introductory

This Report deals with the issues relating to color television raised in the above-entitled proceedings. The hearings with respect to these issues were held before the Commission *en banc*, commencing on September 26, 1949 and closing on May 26, 1950. Pursuant to the Commission's Notice of May 10, 1950, the parties were permitted to file Proposed Findings and Conclusions on or before June 26, 1950, and replies thereto by July 10, 1950. Proposed Findings and Conclusions, and Replies were filed by Color Television, Incorporated (CTI), the Columbia Broadcasting System, Inc. (CBS), and the Radio Corporation of America (RCA). Paramount Television Productions, Inc. and Chromatic Television Laboratories, Inc., jointly filed Proposed Findings and Conclusions and a Reply as *amicus* pursuant to the Commission's letter of May 31, 1950.

A. *General Description of Proceedings*

1. These proceedings include not only the issues relating to color television but comprehend a general study and re-

view of the existing commercial television service which occupies 12 channels in the frequency band 54 Mcs. to 216 Mcs. (the Very High Frequency Band, or VHF) and a review of the status of television experimentation and development in the experimental frequency band 470 to 890 Mcs. (the Ultra High Frequency Band, or UHF) with a view to opening this portion of the spectrum for regular television operations. The existing television service is [fol. 112] based on rules and regulations, engineering standards, and a table of channel allocations adopted by the Commission in 1945. Since that time the commercial television service has expanded rapidly from 6 stations on the air in 4 cities, to 106 stations rendering television program service in 65 cities. Since that time, also, over 30 experimental operations have been conducted in the UHF band.

2. The current hearings had their inception in two proceedings instituted by the Commission on May 5, 1948. The first proceeding (Dockets 8736 and 8975) was initiated by the Commission's Notice of Proposed Rule Making of May 5, 1948 (FCC 48-1569).[1] This Notice related to the 12 VHF channels and proposed an amendment of the television allocation table to provide a redistribution of the 12 VHF television channels to the various cities and communities throughout the United States. In general, the 1945 allocation table provided assignments for the 140 metropolitan districts; the Notice of Proposed Rule Making proposed to make additional assignments in some of these metropolitan districts and to provide assignments for some communities not previously covered. During the hearings held in this matter in June and July, 1948, evidence was adduced concerning tropospheric and other types of interference which made it appear probable that the mileage separations provided between co-channel and adjacent channel stations in the existing allocation table and in the Commission's proposed amendments, were not sufficient to permit stations in many areas to provide interference-free service to a

[1] Docket 8736 was instituted by Notice of Proposed Rule Making issued January 20, 1948 (FCC 48-126) proposing to amend the television allocation table to carry out a tentative agreement with Canada with respect to border allocations. Docket 8736 was consolidated with Docket 8975 on May 5, 1948.

reasonably large area. As a result, the Commission, after a public conference on September 13 and 14, 1948 on the subject, adopted its so-called freeze order of September 29, 1948 (FCC 48-2182) under which television applications were placed in the pending file to await the outcome of the current hearings. This was done in order to give the Commission the flexibility required to carry into effect the lessons to be learned from the forthcoming proceedings. It would obviously have served no useful purpose to have conducted these proceedings if the Commission in the meantime had continued to license television stations in accordance with the old standards, for any change in allocations which would be indicated by the proceedings could be carried out only at the price of excessive dislocation to existing operations.

3. The second proceeding instituted by the Commission on May 5, 1948 (Docket 8976) was intended primarily to obtain the fullest informationn available in the present state of the television art upon the development of transmitting and receiving equipment for use in the UHF band (470 to 890 Mcs.), for either monochrome or color television, and to consider any proposals for the utilization of this band for commercial television broadcasting.[2] The initial hear- [fol. 113] ing on this phase of the proceedings was held September 20 to 23, 1948. It was the consensus of those industry experts who testified at this hearing that color television was not yet ready for commercialization.

4. The scope of the proceedings as set forth in the Notice of Proposed Rule Making and the Order, adopted May 5, 1948, was enlarged by a Notice of Further Proposed Rule Making (FCC 48-2256), adopted October 14, 1948, entitled "Amendment of the Commission's Rules, Regulations and Engineering Standards Concerning the Television and Frequency Modulation Broadcasting Services"

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[2] Docket 8976 was instituted by the Commission's order of May 5, 1948 (FCC 48-1570 which dealt with the frequency band 475 to 890 Mcs. However, the Commission's order of May 25, 1949 (FCC 49-729) added Issue 5 with respect to whether the band 470-500 Mcs. should be allocated to multichannel broad band common carrier mobile radio operation, and revised the caption of the proceedings to include 470 to 890 Mcs.

(Docket 9175). This notice set up a series of engineering conferences for the purpose of undertaking a general review of the rules, regulations and engineering standards in the VHF television service.

5. On November 30 to December 3, 1948, the Commission's staff conducted the informal engineering conferences referred to in the preceding paragraph. At this conference, an *Ad Hoc* Committee was appointed composed of engineering experts from the Commission, other government agencies, and the industry, for the purpose of studying VHF propagation factors. This Committee, after six months of study, submitted a report to the Commission shortly before June 8, 1949. The data and conclusions in the *Ad Hoc* Committee's Report were utilized by the Commission in instituting the present phase of the television hearings by the issuance on July 11, 1949 of a Notice of Further Proposed Rule Making (FCC 49-948) in which the Commission proposed a substantial revision of the VHF allocation table, as well as other matters discussed in the following paragraph.

6. On July 11, 1949, the Commission issued a comprehensive Notice of Further Proposed Rule Making (FCC 49-948) based upon a study of the previous proceedings to date. In this notice, the Commission proposed an extensive revision of its Rules and Regulations and Standards of Good Engineering Practice relating to separation of stations, service areas of stations and allocation principles. In particular, an extensive revision of the allocation table was proposed, based upon the utilization of the 12 VHF channels and also 42 UHF channels; the Notice proposed that the same standards be utilized on these UHF channels as on the VHF channels. Interested persons were also invited to submit comments concerning the utilization of color television under certain prescribed conditions. Finally, interested persons were given an opportunity to offer comments or evidence on such matters as allocation of frequencies in the band 470-500 Mcs. for multi-channel broad band common carrier mobile radio operation; "polycasting"; "stratovision"; and provision for non-commercial educational television broadcast stations in the UHF. As has previously been indicated this Report deals only with the color phase of these proceedings. Subsequent reports will cover the other phases of these proceedings.

[fol. 114] B. *Prior Consideration of Color Television by the Commission*

7. Before proceeding to a discussion of the color phase of the instant proceedings, a brief history of prior action by the Commission in this field is included as useful background. The question of color television has been before the Commission on several occasions, although it was not until 1946 that a formal proposal for the adoption of standards for commercial operation of a color television system was presented to the Commission. Color television systems were first considered by the Commission in a public hearing on January 27, 1941 when the Commission received evidence concerning the Interim Report of the National Television System Committee (NTSC) covering television standardization in the VHF band (Docket 5806). Panel 1 of the NTSC analyzed five American color television systems, all of which were intended to operate in a 6-megacycle channel.[3] Of particular interest to those proceedings in the CBS System No. 3 which was demonstrated in August, 1940, and utilized 343 lines, 60 frames and 120 fields, with mechanical filter discs or drums at the transmitter and receiver. Panel 1 noted that other color television systems were in existence, but were not analyzed because they were broad band and would not work in a 6-megacycle channel. Of particular interest in this category is the RCA System G which was described as a "three-channel, three color additive system consisting essentially of an independent chain of equipment (RMA standards) for each of the three colors, including a separate kinescope of proper screen color for each, with optical combination of the three images." RCA had demonstrated its system to the Commission in February, 1940.

8. On February 27, 1941, the Commission issued a public notice setting forth alternative standards for both monochrome and color television. The hearing on this proposal was held March 20-24, 1941 (Docket 5806). The Report of

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[3] Four of these systems were variations of the CBS system, with differences in lines, frames and type of interlace principally; the fifth was a General Electric 2-color system, using dichromatic filter discs, with the odd lines always —in one color, and the even lines always in another color.

the NTSC submitted to the Commission in that hearing stated as to color television:

> "The NTSC believes that, although color television is not at this time ready for commercial standardization, the potential importance of color to the television art requires that—
>
> "(a) A full test of color be permitted and encouraged, and that (b) After successful field test, the early admission of color transmissions on a commercial basis co-existent with monochromatic television be permitted employing the same standards as are herewith submitted except as to lines and frame and field frequencies. The presently favored values for lines, and for frame and field frequencies for such a color system, are, respectively, 375, 60, and 120 * * *".[4]

[fol. 115] On May 3, 1941 the Commission issued its "Report on March 20, 1941 Television Hearing" (Mimeo. 49851). On the same day it released its Order, dated April 30, 1941, in which the first commercial television rules and regulations, and television standards, were adopted. As to color television, the Commission's Report stated:

> "The three-color television demonstrated by the Columbia Broadcasting System during the past few months has lifted television broadcasting into a new realm in entertainment possibilities. Color television has been known for years but additional research and development was necessary to bring it out of the laboratory for field tests. The three-color system demonstrated insures a place for some scheme of color transmissions in the development of television broadcasting.
>
> "The NTSC proposals provide that color television be given a six-month field test before standardization and commercialization. The Commission finds this requirement necessary. However, immediate experimental color program transmissions are encouraged.
>
> "The standards proposed by the NTSC provide for most of the improvements held out as readily possible

[4] The Report of the NTSC recommended for commercial monochrome standards 525 lines, 30 frames, 60 fields, and a 6-megacycle channel.

a year ago for monochrome transmissions (black and white pictures). These standards fix the line and frame frequencies at 525 and 30, respectively. The 525 lines provide for greater detail in the pictures transmitted than the 441 lines advocated a year ago. They give substantially equal resolution and more fully exploit the possibilities of the frequency bands allocated for television. Different line and frame frequencies will likely be required for color transmissions. This, however, is a matter for future consideration after color transmissions have been adequately field tested. * * *

"The Commission is requesting the industry to provide the necessary test data as to both color transmissions and synchronizing signals within the six-month period following the beginning of commercial operation."

9. The Commission's Order adopted transmission standards for monochrome—525 lines, 30 frames, and 60 fields—with the following footnote:

"The presently favored values for lines and for frame and field frequencies for experimentally field testing color transmissions are, respectively 375, 60 and 120;"

and further provided that "on or before January 1, 1942, the licensees of television broadcast stations shall submit to the Commission complete comparative test data on color transmissions, with recommendations as to standards that may be adopted by the Commission for color television."

[fol. 116] 10. At a public hearing before the Commission, held on April 9, 1942 (Docket 5806), NTSC testified that it had submitted a report on color television to the Commission; and that it was felt that the demands of the national emergency had prevented the industry's proceeding with color television experimentation to the extent that would have been possible in normal times and as a result definitive conclusions could not be presented.

11. Testimony on color television was again presented to the Commission in the 1944-1945 general allocation proceeding (Docket 6651). In that hearing, which was held

from September 28 to November 2, 1944, the Radio Technical Planning Board (RTPB) recommended to the Commission that "adequate standards for color television for a six-megacycle channel cannot be established at this time" but stated that, "this action was taken without prejudice to the continuation of experimentation in color television in such channels." It further recommended that:

> "Provision should be made at this time for higher frequency channels in which experimentation and development may be conducted looking toward an improved service which may include color, higher definition and any other improvements which may occur. It is recommended that the channels be twenty megacycles wide, but that no other standards be established for them at this time."

12. In the 1944-1945 hearing, witnesses for CBS discussed the utilization of the UHF band for high definition monochrome and color television, and stated that their experimentation looked toward widening of the present 4-megacycle video band to 10 megacycles, requiring a total channel width of 16 megacycles, to be utilized for 735-line monochrome transmissions and 525-line color transmissions. An RCA witness took the position that "the primary purpose of going to higher frequencies and wider bands should be to obtain adequate color television with at least as much detail as now obtained in black and white."

13. The Proposed Report of the Commission, issued January 15, 1945, and the Final Report of the Commission, issued May 25, 1945 in Docket 6651, in general, reaffirmed the standards for monochrome in the VHF band. The UHF band was allocated to television experimentation for the purpose of developing color television and high definition monochrome television. The Final Report contained the following statement concerning the UHF band:

> [fol. 117] "As was pointed out in the proposed report, the Commission is still of the opinion that there is insufficient spectrum space available below 300 megacycles to make possible a truly nation-wide and competitive television system. Such a system, if it is to be developed, must find its lodging higher up in the spectrum where more space exists and where color pictures and superior monochrome pictures can be de-

veloped through the use of wider channels. In order to make possible this development of television, the Commission has made available the space between 480 and 920 megacycles for experimental television. The time which may elapse before a system can be developed to operate on wider channels on these ultra-high frequencies is primarily dependent upon the resourcefulness of the industry in solving the technical problems that will be encountered. In this portion of the spectrum it is contemplated that the Commission will license the entire band between 480 and 920 megacycles for experimental television and will not designate any particular channels. Applicants desiring to operate in this portion of the spectrum should consult with the Chief Engineer as to the exact frequency band they should utilize.

"The Commission repeats the hope expressed in its proposed report that all persons interested in the future of television will undertake comprehensive and adequate experimentation in the upper portion of the spectrum. The importance of an adequate program of experimentation in this portion of the spectrum cannot be over-emphasized, for it is obvious from the allocations which the Commission is making for television below 300 megacycles that in the present state of the art the development of the upper portion of the spectrum is necessary for the establishment of a truly nation-wide and competitive television system."

14. The Commission was requested for the first time to promulgate commercial standards for color television in a petition filed by CBS on September 27, 1946. The CBS proposal requested the commercialization of color television in the UHF band, using a field sequential system with 525 lines and 144 fields, and utilizing wide band channels of 16 megacycles. The hearing on this proposal was held between December 3, 1946 and February 13, 1947. Demonstrations on the record of the CBS proposed system were held on January 27 and 28, 1947.

15. Although the CBS system was the only one formally proposed to the Commission for adoption, RCA advanced for consideration a simultaneous system, disclosed to the public on October 31, 1946. Testimony was taken concerning this system and demonstration on the record of this

system was held on January 29, 1947. In the RCA simultaneous system each picture was scanned simultaneously in three colors, the three images were transmitted simultaneously on three video channels, and the images were combined optically at the receiver to produce a single color [fol. 118] picture. Each of the three color pictures could have the same number of lines, frames and fields and the same standards as monochrome transmissions. As demonstrated, however, the system used a total channel of 14.5 megacycles, including 4-megacycle video bands for the green and red channels, and a 1.3 video bandwidth for the blue channel. Since the green signal was transmitted on the same standards as monochrome, except for the UHF carrier, the RCA color transmissions could be received on existing monochrome receivers in monochrome, provided a UHF converter was utilized. RCA mentioned the "mixed highs principle" as having "excellent promise of providing still further reduction in band width requirements."

16. As already indicated, RCA did not propose adoption of standards covering its system. Its purpose in disclosing the system was stated by Dr. C. B. Jolliffe, Executive Vice President in Charge of RCA Laboratories, as follows:

> "Again I wish to emphasize that the simultaneous color system is not disclosed at this time for the purpose of requesting adoption of standards for its operation. Under normal circumstances it would not have been publicized until development had progressed to a more advanced stage.
>
> "It has become necessary, however, to describe this system in order to show that a superior system of color television is possible which is compatible with existing monochrome television and which can be adopted later without loss to the public and the broadcasters who have had enough faith in television to invest in the present excellent system.
>
> "The basic principles are established beyond question, although the engineering details are yet to be worked out. This will require some time, as Mr. Kell will explain, but the end result will be an excellent and practical system introduced without penalty to the existing service and without jeopardy to the investment

of public and broadcasters in black-and-white television."

17. The CBS system was supported at the hearing by Zenith Radio Corporation and Cowles Broadcasting Company. Denial of the CBS petition was urged by RTPB Panel 6 (on Television), RMA, RCA, Philco, DuMont and Television Broadcasters Association.

[fol. 119] 18. The "Report of the Commission" (Mimeo. 5466), issued March 18, 1947, denied the CBS petition, saying, in part:

"Before approving proposed standards, the Commission must be satisfied not only that the system proposed will work but also that the system is as good as can be expected within any reasonable time in the foreseeable future. In addition, the system should be capable of permitting incorporation of better performance characteristics without requiring a change in fundamental standards. Otherwise, the danger exists that the standards will be set before fundamental developments have been made with the result that the public would be saddled with an inferior service, if the new changes were not adopted, or if they were adopted, receivers already in the hands of the public would be rendered useless.

"Judged by the foregoing test, the Commission is of the view that the standards for color television proposed by Columbia Broadcasting System should not be adopted. In the Commission's opinion the evidence does not show that they represent the optimum performance which may be expected of a color television system within a reasonable time. The Commission bases this conclusion on two grounds. In the first place, the Commission believes that there has not been adequate field testing of the system for the Commission to be able to proceed with confidence that the system will work adequately in practice. Secondly, the Commission is of the opinion that there may be other systems of transmitting color which offer the possibility of cheaper receivers and narrower band widths that have not yet been fully explored. Both grounds will be discussed in greater detail further on in the report."

19. In its Report, the Commission called for further experimentation in the color television field:

"Two specific problems, in the Commission's opinion, should be carefully examined. In the first place, there should be further experimentation looking towards the development of low cost television receivers. A large portion of the radio spectrum has been allocated to television. The demand for space in the spectrum from other radio services is very keen and it is not possible to satisfy all requests. The objective of television heretofore mentioned of bringing news, education, culture and entertainment to large numbers of people cannot be carried out unless television receivers are manufactured and sold at a price which the average family can afford to pay.

[fol. 120] "Secondly, further experimentation should be conducted along the line of finding methods of transmitting color television over narrower channels. Under the Columbia proposals, each television channel would be 16 megacycles wide. That means that the band 480 to 920 megacycles would accommodate but 27 channels. It was the Commission's hope in allocating the band 480 to 920 megacycles for television that in this band it would be possible to provide for a truly nationwide competitive television system. The evidence before the Commission shows that 27 channels may not ultimately be enough to provide for a truly nation-wide competitive television system. Every effort must, therefore, be made to narrow the band width required for color television. It should be emphasized that narrowing the band width should not be at the expense of picture brightness, picture detail, color fidelity, or other features of television performance. The objective should be a narrower band width while retaining and even improving the quality of television performance.

"At the hearing there was much testimony concerning the desirability of a system which would permit present television receivers, simply by adding a converter, to receive in monochrome, the broadcasts of stations broadcasting color programs in the 480 to 920 megacycle band. This so-called principle of compatibility, it is urged, will encourage manufacturers

of black and white equipment to proceed at full pace, will enable the public to buy receivers with confidence that they will not be rendered obsolete, and will not impede the development of color television. The Commission is of the opinion that compatibility is an element to be considered, but that of greater importance, if a choice must be made, is the development of the best possible system, employing the narrowest possible band width, and which makes possible receivers capable of good performance at a reasonable price.

"The Commission is of the opinion for the reasons which have been discussed that the petition of Columbia Broadcasting System should be denied. In reaching this decision, the Commission does not desire to minimize in any way the advances that have been made in the development of color television. On the contrary, the Commission is of the opinion that Columbia Broadcasting System, Dr. Goldmark and the people who have worked under him are to be commended for their continuing interest in the field and for the great strides they have made in this field in so short a period. The Commission, however, cannot escape the conclusion that many of the fundamentals of a color television system have not been adequately field tested and that need exists for further experimentation along the lines noted above. It is hoped that all persons with a true interest in the future of color television will continue their experimentation in this field in the hope that a satisfactory system can be developed and demonstrated at the earliest possible date."

[fol. 121] 20. Color television was again explored by the Commission in the hearings held in these proceedings on September 20 to 23, 1948, when the state of the television art in the UHF band was considered (Docket 8976). The Commission's order instituting this hearing contained the following issues:

"3. To obtain full information concerning the state of development of transmitting and receiving equipment for either monochrome or color television broadcasting, or both, capable of operating in the band 475 to 890 Mc.

"4. To obtain full information concerning any proposals for the utilization of the band 475 to 890 Mc.,

or any part thereof, for television broadcasting and the standards to be proposed therefor."

21. In the September 20, 1948, UHF hearing, the Joint Technical Advisory Committee (JTAC), sponsored by the Radio Manufacturers Association and the Institute of Radio Engineers, presented a report on the "Utilization of Ultra-High Frequencies for Television" and submitted the following conclusion as to UHF color television:

"Item 3 of the issues and questions before this hearing * * * states that information is requested on the use of ultra-high frequencies for color television. The JTAC reports that no proposals for standards for commercial operation of a color television system have been made to it. A letter from Mr. Adrian Murphy (Annex 16) outlines but does not propose two color television systems.[5] The JTAC is of the opinion, based on evidence submitted to it by various subcommittees of the RMA and IRE, that it is impracticable to set up commercial standards for color television in the present state of the art.

"The fact remains that even though the ultimate color service cannot be specified at this time, nothing should now be done that would prevent a later allocation of color channels. It is important, therefore, to consider the effect of an interim allocation of UHF channels to a 6-megacycle monochrome service on the eventual establishment of a color service.

"If such interim 6-megacycle allocations are to be made, and if such channels are later to be converted to a color service, it is important to consider the bandwidth relationships of the two services.

* * * * * * *

[fol. 122] "In view of these facts (i.e., the difficulties in converting 6-megacycle UHF monochrome to wider band UHF color), the JTAC comes to the conclusion that it will be difficult, both in theory and practice, to provide for a conversion from UHF monochrome assignments to UHF color assignments. The JTAC believes, therefore, that any assignment of monochrome

[5] Mr. Murphy is a CBS vice-president.

service to UHF channels would represent a permanent removal of the space so occupied from that available for any other service."

C. *Color Phase of Instant Proceedings*

22. As mentioned above, the color phase of the instant proceedings was instituted by the Commission's Notice of Further Proposed Rule Making (49-948), issued July 11, 1949. While in this notice the Commission did not propose specific amendments to its rules and standards looking toward the commercialization of color television, in Appendix A to the Notice the Commission described the conditions upon which it would consider proposals for a change in transmission standards on Channel 2 through 55 looking toward the establishment of color television. Paragraphs II-B and C of Appendix A stated in this connection:

> "B. The Commission will give consideration to proposals for a change in Transmission Standards on channels 2 through 55 looking toward color television or other television systems. Any such proposal shall:
>
> 1. Be specific as to any change or changes in the Transmission Standards proposed; and
> 2. Shall contain a showing as to the changes or modifications in existing receivers which would be required in order to enable them to receive programs transmitted in accordance with the new standards.
>
> "C. It is proposed to consider changes in Transmission Standards for Channels 2 through 55 only upon a showing in these proceedings that:
>
> 1. Such system can operate in a 6-megacycle channel; and
> 2. Existing television receivers designed to receive television programs transmitted in accordance with present transmission standards will be able to receive television programs transmitted in accordance with the proposed new standards simply by making relatively minor modifications in such existing receivers."

[fol. 123] 23. Pursuant to the above notice, comments relating in whole or in part to color television were filed by

the Joint Technical Advisory Committee (JTAC); the Radio Manufacturers Association;[6] the Radio Corporation of America; the Columbia Broadcasting System, Inc.; Color Television, Incorporated; Charles Willard Geer; Leon Rubenstein; Philco Corporation; and Allen B. DuMont Laboratories, Inc. Webster-Chicago Corporation and American Television, Inc., also were made parties to the hearing upon their request. Celomat Corporation was permitted to testify in the hearing on its own behalf. CBS, CTI and RCA were the only parties who appeared as proponents of their own color television systems. The technical characteristics and performance of these three color television systems will be described hereafter.

24. The hearing on the color issues was held before the Commission *en banc* commencing September 26, 1949 and ending May 26, 1950—a total of 62 hearing days, covering 9,717 pages of transcript. The hearing was held in two phases, the first of which ended on November 22, 1949, at which time the hearing was continued to February 6, 1950.[7] The second phase commenced on February 20, 1950 and ended May 26, 1950. During the intervening period, the parties conducted field tests of color television systems pursuant to the Commission's "Notice Concerning Field Test Programs and Further Testimony", adopted November 21, 1949 (FCC 49-1547). The hearings were held in Washington, D. C., except for the second comparative demonstrations of CBS, RCA and CTI color television systems which were held on February 23, 1950 at the Commission's Laboratories at Laurel, Maryland; the CBS demonstration of horizontal interlace held on April 26, 1950 at the CBS Laboratories in New York City; and the CTI demonstration held on May 17, 1950 at San Francisco, California. In all, 53 witnesses testified and 265 exhibits were offered. A list of the witnesses and a description of the exhibits are attached as Appendices A and B.

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[6] Radio Manufacturers Association has changed its name to Radio and Television Manufacturers Association.

[7] On motion of certain parties, the CTI demonstration was extended from February 6 to February 20, 1950, and the second comparative demonstration was extended from February 8 to February 23, 1950 (See Commission's Order Extending Date of Second Comparative Demonstration, adopted December 8, 1949, FCC 49-1622).

25. During the course of the hearing, the following demonstrations were conducted on the record of the proceedings:

(a) On October 6 and 7, 1949, CBS demonstrated its color system at the Carlton Hotel, Washington, D. C.

(b) On October 10, 1949, RCA demonstrated its color system at the Washington Hotel and the Wardman Park Hotel, Washington, D. C.

(c) On November 21 and 22, 1949, a comparative demonstration was conducted at Temporary "E" Building, Washington, D. C., showing the operation of the CBS color system, the RCA color system, and conventional DuMont monochrome television receivers. At this demonstration, the Commission demonstrated a conventional Bendix television receiver equipped with the automatic adapter invented by members of the Commission's staff.

[fol. 124] (d) On February 20, 1950, CTI demonstrated its color system at the Statler Hotel, Washington, D. C.

(e) On February 23, 1950, a second comparative demonstration was conducted showing the operation of the CBS color system, the RCA color system, and the CTI color system, at the Commission's Laboratories at Laurel, Maryland.

(f) On April 6, 1950, RCA demonstrated its trichromatic (three-color) receiving tubes at the Trans-Lux Building, Washington, D. C.

(g) On April 26, 1950, CBS demonstrated its horizontal interlace at the CBS Laboratories in New York City.

(h) On May 17, 1950, CTI demonstrated its color system at the St. Francis Hotel, San Francisco, California.

[fol. 125] II. Description of the Three Systems.

A. *General*

26. In order better to understand the technical operation of the three color systems which have been proposed in these proceedings, it is useful to have a brief general description of how the present monochrome television system works and a discussion of some of the fundamental aspects of color television which are common to all three systems.

It should be noted that many of the technical features of television systems are not capable of accurate description except in very technical terms or complicated formulae; these would not be intelligible to other than scientists or engineers. In order to make this Report as useful and understandable as possible to the public and interested persons with no specialized training, we have simplified the description considerably and have attempted to compare the operation of television systems to well-known techniques in the interest of understandability. This method, of course, does not have the precise accuracy of the more technical description but it will aid in understanding the technical problems involved. Those interested in the more technical aspects of the systems will find such material in the record.

27. A television picture originates in the television camera where an electron beam scans an image of the scene to be transmitted in a series of lines from left to right and top to bottom. The electron beam in the process of scanning generates signals which vary in amplitude in proportion to the relative lightness or darkness of the area in question. As the scanning beam reaches the right hand end of each line, it snaps back to the left hand of the scene and scans another line. This process is repeated until the scene has been scanned from top to bottom. At this point the scanning beam snaps back to the left hand top of the picture and starts the scanning process all over again.

28. From the above, it might appear that the lines are scanned consecutively; and, indeed, in the early experimental days of television this was done. However, it was soon discovered—and this was one of the fundamental developments in early television—that certain advantages could be gained at the expense of only relatively minor disadvantages by scanning alternate lines.[8] Thus, the electron beam scans line 1, skips a line, scans line 3, skips another line, scans line 5, and so on to the bottom of the picture, scanning only the odd lines. The electron beam then snaps back to the top of the picture and scans all the even lines. This process is known as "line interlace" or "vertical interlace."

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[8] The explanation for this is set forth in Paragraph 32, below.

29. At the receiver the process set forth above is repeated. The signals which have been generated by the scanning beam at the camera are received on an antenna connected with the receiver. At the receiver there is also an electron beam which operates in the same fashion as and in step with the one in the camera. The light and dark portions of each line are reproduced on the face of the tube to correspond to the original scene by the action of the electron beam in varying the amount of light generated on the face of the tube in proportion to the amplitude of each signal as generated at the camera.

[fol. 126] 30. In the preceding paragraph, mention was made of the fact that the electron beam at the receiver is in step with the scanning beam at the camera; this is indispensable if a picture is to be achieved. This result is accomplished by means of synchronizing pulses which are generated at the station by means of a synchronizing generator and are transmitted along with the signals already referred to. For the purposes of this description there are horizontal synchronizing pulses and vertical synchronizing pulses. The horizontal synchronizing pulse comes at the beginning of each line. Its function is to make sure that the electron beam snaps back to the position on the left at the correct time. The vertical synchronizing pulse comes at the beginning of each field—i.e. each time the electron beam has scanned from the top of the scene to the bottom—and is designed to assure that the electron beam will snap back to the position at the top of the picture at the appropriate time. During the time that the electron beam is in the process of being snapped back at the end of each line or field, appropriate blanking pulses are transmitted which are designed to black out the electron beam in order to obscure the retrace of the scanning beam.

31. Television reproduction is somewhat similar to the operation of motion pictures. In motion pictures a rapid succession of still pictures is projected on the screen. If the pictures are projected rapidly enough, the eye through the persistence of vision, sees the result as an uninterrupted image. In television, the process also makes use of the persistence of vision in a similar fashion except that the individual pictures are formed by a rapidly moving electron beam instead of the entire scene being shown at once.

32. There remains for discussion the ascertainment of

the number of lines and number of fields per second in the present television system. A system should have a sufficient number of lines to portray the finer vertical detail in the picture. A sufficient number of fields per second is desirable for two reasons. In the first place, in order to have smoothness of motion portrayed, the fields must succeed each other at a rapid rate. If the rate is too slow, the motion will be jerky. In the second place, a high field rate is necessary in order to avoid flicker. If the field repetition rate is too low, annoying flicker is apparent unless the picture is very dim. By increasing the field rate, it is possible to have pictures of adequate brightness with no flicker.

[fol. 127] 33. However, fundamental laws of physics must be reckoned with in establishing standards for lines and fields per second. A television station broadcasts on a channel 6 megacycles wide. Under our present standards about 4 megacycles of video information can be utilized for the picture. Within a 4 megacycle band must be accommodated adequate lines for vertical detail, horizontal detail (usually expressed in terms of lines also) and field repetition rate.[10] Any number of combinations of these variables may be utilized within a 4-megacycle band but in choosing a combination, care must be used to make sure that the result is a balanced picture with adequate detail and a sufficient number of fields per second to make possible

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[9] The relation between the field repetition rate and flicker explains the importance of line interlace discussed in Paragraph 28. Experience has shown that so far as large area flicker is concerned, doubling the field rate with interlace is comparable to doubling the frame rate without interlace. Thus, for a given flicker threshold, line interlace requires only one-half of the scanning speed, and thus for a given amount of picture detail requires but one-half as much band width. This makes possible more effective channel utilization.

Flicker can also be reduced by the utilization of tubes with long persistence phosphors as explained in paragraphs 58-60.

[10] In addition, the necessity of allowing time for vertical and horizontal blanking prevents the continuous use of the band width for transmission of picture detail.

smoothness of motion and adequate brightness of pictures without objectionable flicker. The values which the Commission has adopted for black and white television are 525 lines per picture, 30 frames per second, and 60 fields per second. With this combination the horizontal resolution in terms of lines is 380.[11] To express the same result in another manner, the present standards provide for a horizontal synchronizing pulse rate—the number of times per second a horizontal synchronizing pulse is required to snap back the electron scanning beam—of 15,750 (525 x 30) and a vertical synchronizing pulse rate of 60. As has already been stated, any one of the above values can be changed but when this is done a change in one or more of the other values is automatically required if a 4-megacycle band is utilized.

34. Thus far, we have described generally the operation of monochrome television. So far as color television is concerned, in theory it is accomplished in the same way as monochrome television except that each picture is sent three times, once in each of the three primary colors utilized—red, green and blue. These primary components may be transmitted simultaneously, as they are in color movies, or sequentially at a sufficiently rapid rate so that the persistence of vision causes the eye to blend them together. All of the systems proposed in this hearing are sequential systems; the major differences lie in the scanning patterns and the rate at which the primary colors are changed. The larger the area continuously sent in one primary the less rapidly will the color changes occur. The scanning pattern and the color switching rate determine the apparatus requirements and the success of maintaining the illusion of continuity. The Columbia system is a field sequential system, in which the colors are changed between each field 144 times per second, and color pictures are transmitted at a rate of 24 per second. The CTI system is a line sequential system, in which the colors are changed between each scanning line at a rate of 15,750 times per

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[11] This is the approximate theoretical capacity of the system, ignoring blanking time. The present standards provide that 82 to 86 percent of the line scanning time may be used for horizontal blanking and 5 to 8 percent of the lines are lost during vertical blanking.

second, and color pictures are transmitted at a rate of 10 [fol. 128] per second. The RCA system is a dot sequential system, which involves a color change between elemental picture areas along each scanning line, and a switching rate of about 11 million times per second. Color pictures are transmitted at a rate of 15 per second.

35. It would appear from the foregoing that a video channel three times the width of the monochrome channel would be required for color television. However, by means of certain band-saving devices or by a change in one or more of the factors set forth in Paragraph 33, or by a combination of both methods, each of the proponents has devised a system that is designed to work in a 6-megacycle channel. These processes are described in detail later on in this Report in connection with each of the systems.

B. *The CTI System*

36. It is difficult to make an adequate description of the CTI system because it was frequently changed during the course of the hearing, technical witnesses for CTI were not in complete agreement, and some of the more complicated points were never clearly expounded by CTI. We have, however, endeavored to make as complete and accurate a description as possible.

37. As has already been indicated, the CTI system is a line sequential system. In this system, scanning is at the same rate as in the monochrome system—15,750 lines and 60 fields per second. The system derives its name from the fact that as the scanning of each line is completed, the color is changed. Thus, line 1 is scanned in red, line 3 in green, line 5 in blue, line 7 in red, and so on to the bottom of the picture. This completes a field and the scanning beam snaps back to the top of the picture where the even lines are then scanned in the same fashion. Thus, at the end of the second field, all of the lines have been scanned once, but each line will have been scanned, in but one color. In order for each line to be scanned in each color, it is necessary to change the initiation of the color scanning between fields. Otherwise, in field 3, line 1 would be scanned in red again, line 3 in green, line 5 in blue, and so on. It is thus necessary to provide, for example, that in field 3, line 1 be scanned in green and in field 5, in blue. This change in the initiation of the color scanning insures that

each line is scanned in each of the three primary colors. As a result, it takes six complete fields within which all lines are scanned in all colors. Thus, in this particular system, 10 color pictures are completed each second.

38. If a uniform change in the initiation of color scanning—such as is described in the preceding paragraph—were utilized, a serious line crawl would be apparent across the image. Several sequences of non-uniform shifts were demonstrated by CTI in an effort to minimize line crawl. One of the earlier shifts was called the single shift and resulted in scanning each picture line in only two of the three primary colors. This shift was abandoned by CTI in favor of a double shift. Several variants of the double shift were described by CTI witnesses. The most recent form of double shift and the one presently urged by CTI [fol. 129] was demonstrated in San Francisco on May 17, 1950. It is called the interlaced shift. In this system, the order of scanning is changed from the normal pattern where odd lines are first scanned and then even lines, so that the odd lines are scanned in three successive fields, then the even lines are scanned in three successive fields, and so on. The color sequence scanning is so arranged that adjacent lines are not scanned in the same color in successive fields and the progression of color from line to line is revised at intervals not in excess of three succeeding fields. Ten complete color pictures per second result from the interlaced shift. An additional synchronizing pulse is required during the vertical blanking period for the operation of the color shift.

39. The apparatus with which CTI demonstrated its system may be briefly described as follows: At the transmitting end there is a single camera tube, upon the surface of which the optical system projects three primary color images of the scene, side by side—red, green and blue. The electron beam starts scanning at the left which is in the red area. This portion of the tube responds only to red components and as the electron beam scans through this red portion, it generates signals which vary in amplitude in proportion with the relative intensity of the red components. It takes 1/15,750 of a second to complete line 1—the time required under our present standards for the scanning of one line. At the expiration of this time, the scanning beam enters the green area and since the electron beam scans at a

sloping angle, the beam is now at line 3. This line is scanned in green in 1/15,750 of a second. The scanning beam then enters the blue area at line 5 and scans this in blue in 1/15,750 of a second. The electron beam then snaps back to the left hand side of the picture to scan line 7 in red, and so on until one field is completed in 1/60 of a second. The process is then repeated for successive fields. At the receiver, a similar scanning process is employed in connection with a cathode-ray tube having three vertical bands of color primary phorphors—red, green and blue. A suitable optical system is employed to superimpose the three color images on a viewing screen.

40. All of the synchronizing signals, horizontal and vertical, employed in the case of monochrome are also utilized in the CTI system; there are also additional synchronizing signals discussed above. The CTI color receiver must be so constructed that it does not react to each horizontal synchronizing pulse in the same manner as a monochrome receiver. If it did, the scanning beam would be snapped back to the left hand of the picture when the first pulse is transmitted—at 1/15,750 of a second. However, at that moment the scanning beam has only traversed the first third of the tube's surface—the red portion—and must still [fol. 130] scan across the green and blue surface. Accordingly, appropriate circuits are required to make sure that the scanning beam is snapped back only after every third horizontal pulse. This can be accomplished by appropriate counting circuits or by adding an appropriate pulse during the blanking period of each third horizontal pulse.

C. *The CBS System*

41. In the CBS system scanning is accomplished in the same manner as in the present system. First, all of the odd lines are scanned and then the even lines, and so on. The effect of color is achieved by the fact that when the odd lines are scanned in the first field, they are scanned in red; the even lines of the second field are scanned in blue; the odd lines of the third field are scanned in green; the even lines of the fourth field are scanned in red; the odd lines of the fifth field are scanned in blue; and the even lines of the the sixth field are scanned in green. Thus, it takes six complete fields to produce one complete color picture.

The fact that the color is switched at the end of each field gives the CBS system its name, field sequential system.

42. The CBS system does not utilize the same scanning standards as does monochrome television. Instead of 525 lines the CBS system has 405 lines. The theoretical horizontal resolution in terms of lines is reduced from 380 lines to 205. A field rate of 144 per second is employed instead of 60, and 24 complete pictures per second result rather than 30. Under the CBS system the horizontal synchronizing rate is 29,160 per second[12] as compared with 15,750 per second for black and white, and the vertical synchronizing rate is 144 per second as contrasted with 60 per second for black and white.

43. During the latter stages of the hearing, CBS offered testimony concerning the utilization of horizontal interlace in its system as a means of improving horizontal detail; it did not offer horizontal interlace as a proposal. A dem- [fol. 131] onstration of this process was held on the record in New York City on April 26, 1950. In this system, each line is broken up into picture elements with blank spaces in between. In the first field, alternate dots are sampled for the odd lines; in field two, alternate dots are sampled[13] for the even lines. The blank spaces are filled in by successive fields. It thus takes 12 fields to produce a complete color picture and as a result 12 complete color pictures per second occur. However, even with horizontal interlace, color switching in the CBS system occurs after each field, the horizontal interlace being used to increase the horizontal resolution.

44. The apparatus utilized by CBS to demonstrate its system can be described as follows: At the camera a rotating disc containing segments of red, blue and green filters is inserted between the lense and the tube. The disc rotation is coordinated with the field scanning rate of 144 per second. In the 1/144 of a second that the red filter is in

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[12] This figure is derived as follows: Each complete picture per second has 405 lines. Each of the 24 complete color pictures is composed of three 405 line pictures made up of red, blue and green components. Thus, 405 x 24 x 3 = 29,160.

[13] A description of sampling is set forth in Paragraph 51 in connection with the RCA system.

front of the tube, all of the odd lines are scanned. Since the filter transmits red components, the scanning beam generates signals that vary in amplitude in proportion to the varying intensity of the red components of the scene being transmitted. The same process is repeated for each field. At the receiver a rotating disc with colored segments is placed in front of the cathode-ray tube. When the receiver is turned on and the motor attains its full speed, the color disc may or may not be in proper step with the disc at the camera. If the colors are false, as indicated by skin tones or other obvious color faults, the viewer presses a button to place the disc in step. This may require one or two pushes of the button. Once the correct color position is attained, the synchronizing pulses automatically keep it correct. The scanning at the receiver repeats the process at the camera end, and a color picture results. At the New York demonstration, CBS also demonstrated a projection receiver somewhat similar to that employed by CTI. In addition, at the Laurel demonstration, it demonstrated a receiver which automatically chose the correct color. This requires an extra synchronizing signal to insure correct color phase.

[fol. 132] D. *The RCA System*

45. It is difficult to make an accurate description of the RCA system because it involves new and complex techniques, many of which were never clearly expounded during the hearing. We have, however, endeavored to make as complete and accurate a description as possible.

46. The RCA system unlike the other two systems involves a change in the scanning method utilized under the present system. As will be recalled, under the present system the electron beam scans a line continuously from left to right, skips a line, scans another line, and so forth until the end of the field. The lines that were not scanned during the first field are then scanned in the second field. This is line interlace and the process is retained in the RCA system. What RCA has done is to add a process called dot interlace. As the name implies, dot interlace is accomplished by scanning each line in a series of dots rather than continuously. As illustrated in the table below, during the first scanning field, the odd numbered lines are scanned in order. Colored dots are laid down in order along line

1 as shown. Next, line 3 is scanned with a displacement for each color dot shown. The remaining odd lines are scanned in order. This scanning of the first field takes place in one-sixtieth of a second.

47. During the second field, the even lines are scanned, first line 2 with the colors laid down as shown, then line 4, and so on. The dot pattern laid down during the third field is shown by the lower diagram where the odd lines are scanned in succession. During the fourth field, the even lines are again scanned in succession with the color dot pattern shown. Thus, the odd lines are scanned during the first field, but dots of the same primary color are separated by spaces. The even lines are scanned during the second field, again with spaces between like color dots. During the third field, the odd lines are again scanned but with the color dots displaced so that the spaces are filled. The even lines are scanned during the fourth field, with the color dots displaced to fill in the spaces left during the second field scanning. Four scanning fields are required to completely cover the picture area, with all spaces filled, with say, green dots. Simultaneously, the area is being covered with red dots and with blue dots. Since there are 60 fields per second, it may be said that there are 15 complete color pictures per second.

[fol. 133]

1st Field

Line						
1	G	R	B	G	R	B
2						
3	B	G	R	B	G	R
4						
5	G	R	B	G	R	B
6						

2nd Field

Line						
1						
2	B	G	R	B	G	R
3						
4	G	R	B	G	R	B
5						
6	B	G	R	B	G	R

3rd Field

Line							
1		B	G	R	B	G	R
2							
3	G	R	B	G	R	B	
4							
5		B	G	R	B	G	R
6							

4th Field

Line							
1							
2	G	R	B	G	R	B	
3							
4		B	G	R	B	G	R
5							
6	G	R	B	G	R	B	

Combining the above lines, dots and fields into one table, we have the following representation of a complete color picture (the numbers in the table refer to fields):

Line	G	B	R	G	B	R	G	B	R	G	B	R
1	1	3	1	3	1	3	1	3	1	3	1	3
2	4	2	4	2	4	2	4	2	4	2	4	2
3	3	1	3	1	3	1	3	1	3	1	3	1
4	2	4	2	4	2	4	2	4	2	4	2	4
5	1	3	1	3	1	3	1	3	1	3	1	3
6	4	2	4	2	4	2	4	2	4	2	4	2

48. Scanning is accomplished in the following manner. The RCA color camera consists of three separate camera tubes each of which is capable of response to 4 megacycles. In front of these tubes is an optical system consisting of dichroic mirrors and lens. The dichroic mirrors are so constructed that each one reflects only one of the three primary colors—green, blue, red. The light reflected by each such mirror falls upon the photosensitive surface of one of the three camera tubes. Each of the camera tubes has applied to it the same horizontal and vertical scanning pulses from a common synchronizing generator. The electron scanning beams in the three tubes thus scan the entire scene simultaneously and generate separate signals. Of course, the signals generated by the scanning beam in the green

tube vary in amplitude in proportion to the relative intensity of the green components of the picture being scanned and similarly for the blue and red cameras.

[fol. 134] 49. Thus, three signals are derived from the camera tubes, each with a response out to four megacycles. Since these signals must be transmitted in a 4-megacycle video band, some method must be devised of combining or merging these signals for purposes of transmission. To understand how this is done, a discussion of the so-called mixed-highs principle is necessary.

50. As was set forth above, each of the three camera tubes in the RCA system is capable of response out to four megacycles. Where a picture being scanned does not have fine detail, the full response of 4 megacycles is not necessary. Coarse detail can be transmitted by a camera with a much narrower response—e.g., 2 megacycles. The response between 2 and 4 megacycles is necessary for fine detail. During the hearings RCA presented evidence designed to show that the human eye is not at all sensitive to fine detail in color; that the physiology of the eye is such that it can distinguish colors only in coarse detail; for example, the eye can recognize color in a piece of colored string but cannot in the case of a single strand of colored thread held at any appreciable distance from the observer. RCA testified that it devised a system whereby the coarse detail of the picure (e.g. from 0-2 megacycles) is transmitted in color whereas the fine detail in each of the colors (e.g. from 2-4 megacycles) are "mixed" together and transmitted as black and white pictures. The two signals are then transmitted together and give a color picture composed of the low frequency components (0-2 megacycles) for each of the three primary colors and the mixed highs (2-4 megacycles) as black and white.

51. It is claimed that the above process has saved band width. Instead of 12 megacycles being required to transmit three 4-megacycle signals, the requirement is reduced to eight megacycles—2 megacycles for each of the 3 low frequency color signals and 2 megacycles for the mixed highs. Of course, even 8 megacycles are too much for the 4 megacycle band available. RCA endeavors to save the rest of the space by a process known as dot interlace which involves color sampling. Part of the band saving comes from the fact that it requires four fields instead of two in

order to completely scan the picture area once as illustrated in paragraphs 46 and 47. The rest of the apparent band saving comes from permitting a certain amount of cross talk (dilution of color and contrast) in the picture. Each of the 3 signals passes through appropriate electrical filters. These filters separate the low frequency components (0-2 megacycles) out of each of the three color signals. The low frequency color signals are sent to an electronic commutator or sampler. The remaining high frequency components are combined into mixed highs. The sampler op- [fol. 135] erates as an automatic high speed valve that opens and closes at a rate of approximately 11 million times per second. The three color signals enter the sampler. The sampler is so arranged that each 3.6 millionth of a second the sampler opens the valve to the green, red and blue signals in sequence and permits that portion of the particular color signal to pass through to a so-called adder circuit. Thus, instead of transmitting the entire 2-megacycle component for each of the 3 colors, a dot sample is taken at regular intervals. The sampling sequence and the method of dot interlace for the samples taken in successive fields have been described in paragraphs 46 and 47.

52. The mixed highs are also fed into the adder circuit, referred to in the preceding paragraph. The appropriate synchronizing signals [14] are added at this point also and all the signals are then sent to the transmitter.

53. The apparatus utilized by RCA to demonstrate its system has already been described so far as the camera is concerned. The receiving apparatus demonstrated at the original October demonstration consisted of projection receivers, and direct view receivers employing two or three color tubes and dichroic mirrors. The two-tube dichroic mirror receiver, showing two-color television, was not demonstrated again and an RCA witness testified that "the need for a two-color process will be pretty much submerged" when a tri-color tube is developed. Likewise, the projection

[14] In addition to the usual horizontal and vertical synchronizing pulses, an extra synchronizing pulse, consisting of a burst of the sampling frequency, is added after each horizontal pulse during the blanking period. Its purpose is to keep the color sampler at the receiver and the one at the transmitter in step with each other.

receivers were not exhibited again after the original demonstration, and until the April 6, 1950 demonstration all receivers shown by RCA contained dichroic mirrors and three cathode-ray tubes. At the April 6 demonstration, two models of a direct view color tube were demonstrated—one with three electron guns and the other with a single electron gun. RCA described these tubes as follows: In each model the screen of the tube consisted of 117,000 groups with 3 primary color phosphor dots in each group. Between the electron gun and the screen was a mask with 117,000 holes in registry with the dot groups. On the tube with three guns the signals were applied to the three guns in the same manner as to three separate kinescopes. The angle of arrival from each gun was so arranged that each beam hit the hole in the mask in such a way as to line up correctly with the appropriate dot of color phosphor. In the one-gun model the signals were applied to the gun sequentially and the beam was rotated by appropriate deflection circuits keyed to the sampler to insure the correct angle of arrival at the holes in the mask. An RCA witness testified that it was part of the RCA development program to increase the number of picture dots in the tri-color tube with a view to doubling them. The tri-color tubes demonstrated provided a picture about the size of a 14-inch monochrome tube, but RCA testified that there was no reason why a larger tri-color tube could not be made.

[fol. 136] III. Evaluation of the Three Systems

A. *General*

54. In the preceding section of this Report, we had a description of each of the three proposed color systems. In this section of the Report we will evaluate the three systems under each of 9 headings. It should be recognized that when a composite picture is segmented for the purpose of analysis, there is inevitably some overlapping in the categories and some of the characteristics that are included under one heading could just as well have been included under a different heading. The evaluation of the three systems is based upon the testimony and evidence in the record and upon the observations which the Commission had an opportunity to make at the demonstrations held on the record. In making this evaluation consideration is

given to each of the systems as demonstrated in these proceedings and also to potentialities for improvement which may be inherent in the systems, based upon developments disclosed in the record.

B. *Flicker, Motion Continuity, and Allied Effects*

1. *General*

55. There are three subjects which are covered by this heading: large area flicker, small area flicker, and continuity of motion. Large area flicker is a problem in television as in motion pictures. The problem arises from the fact that appearance of motion is achieved by a rapid succession of pictures thrown on the viewing surface. The pictures themselves are illuminated on the viewing surface, but during the period that a picture is being changed the viewing surface is dark. If the rate of change of pictures is too slow, noticeable flicker appears on the screen which is very annoying to the viewer and the brighter the picture the more annoying the flicker. Thus, a fast repetition rate is important to elimmate flicker. The rate must be high enough so that a picture of adequate brightness is possible; the higher the repetition rate the brighter the picture which can be viewed without flicker. In monochrome television a repetition rate of 60 fields per second is employed.[15]

56. Small area flicker is a problem for television but not for motion pictures. In motion pictures a complete still picture is transmitted as a whole, but in television adjacent lines on the face of the tube are scanned during different fields as a result of line interlacing and this gives rise to interline flicker. In dot interlace television systems there is, in addition, inter-dot flicker. Both are considered under small area flicker.

57. The problem of continuity of motion has two aspects. First, in order to achieve smoothness of motion and avoid jerkiness, the picture repetition rate must be sufficiently

[15] The ability to observe flicker varies from person to person. It is affected by the amount of illumination in the room, the highlight brightness of the picture, the field rate, the luminosity in case of color, the relative duration of light to darkness, and also by the ratio between the picture height and the distance of the viewer from the screen.

high so that the persistence of vision in the eye creates the illusion of smooth motion. The second aspect of the problem deals with the ability of the system to portray [fol. 137] moving objects. Where a moving object is being scanned, it is apparent that it will be in a slightly different position in each of successive fields. There is a tendency for moving objects to be smeared and for detail to be lost. The faster the field repetition rate, the better the results that can be expected with respect to continuity of motion.

58. In order to understand the potentialities for improvement in the three systems so far as flicker is concerned, an understanding of the decay nature of phosphors is necessary. The phosphor utilized on the receiving tubes in television receivers has the property of being illuminated when hit by the electron scanning beam. The illumination remains for a time after the scanning beam has moved on, but shortly thereafter the illumination ceases. This cessation is not abrupt but gradual; hence the expression, the "decay" characteristics of phosphor. "Slow decay phosphors" and "long persistence phosphors" are correlative terms and are used interchangeably in this Report.

59. In practice, the phosphors presently utilized are fast decay phosphors. It can readily be seen that by utilizing slow decay phosphors, there is a good deal of room for reducing the flicker problem without increasing the field rate, or conversely to reduce the field rate and permit an increase in resolution. This is due to the fact that slow decay phosphors by their nature increase the time that the tube face is illuminated and decrease the time that it is dark. Since flicker is produced by the alternation of light and dark time on the viewing surface, anything that decreases the amount of dark on the viewing surface, has an effect so far as flicker is concerned similar to increasing the repetition rate. There has been no incentive for the utilization of slow decay phosphors in our present system since the repetition rate is high enough to provide adequate brightness without flicker even when fast decay phosphors are used.

60. There was testimony in the record concerning long persistence phosphors and a demonstration of one such phosphor was held on the record in the CBS Laboratory in New York on April 26, 1950. The tri-color tubes shown at the RCA demonstration of April 6, also had long persistence phosphors. While the Commission is anxious to

see further testing conducted, we are nevertheless able to find on the basis of this record that long persistence phosphors are practical and can be taken into account in considering the potentialities of the systems under consideration.

[fol 138] 61. During the hearing frequent reference was made to receiver storage tubes. A storage tube is a specialized long persistence tube. It has the property that once it has been illuminated, it will retain that level of illumination until replaced by a different level of illumination; the change is instantaneous. If such a tube were developed for use in home television, it would reduce flicker substantially since it would shorten the blackout period on the viewing screen. However, no demonstration was made of such a tube nor was any evidence offered that such a tube has been developed, or could be developed within the foreseeable future. Accordingly, we are unable on this record to take storage tubes into account in arriving at our decision.

2. *The CTI System*

62. As has been indicated, the susceptibility of a television system to large area flicker depends on the number of fields per second. The CTI system has a field rate of 60 per second, the same as the present television system and should have about the same performance characteristics on this score when showing black and white picture. So far as color pictures are concerned, insufficient evidence was offered as to whether the flicker characteristics are the same as for black and white pictures. There was no flicker observed at any of the demonstrations on the record but it should be noted that the pictures had very low illumination.

63. There is a problem in the CTI system so far as small area flicker is concerned. In all of the demonstrations there was a most noticeable line crawl or jitter, which seriously marred the quality of the transmitted picture. The line crawl apparently results from the fact that there is a relatively low line repetition rate in each of the primaries and the eye thus tends to follow each line down. As was pointed out above, line crawl is inherent in a line sequential system where the shift in initiation of colors is uniform. The purpose of the various shifts developed by CTI was to eliminate the problem, but they did not accomplish this purpose. Although the last shift demonstrated—the interlaced shift—

may have reduced line crawl somewhat, it still remains to a prominent degree. This line crawl or jitter was noticeable even with the very low level of picture illumination that CTI was able to produce on its projection receiver. Since line crawl is a flicker phenomenon, it can be expected to be intensified with increased brightness. This turned out to be the case at the San Francisco demonstration where the CTI color transmissions utilizing the interlaced shift were received on a 3-tube, diehroic mirror type of receiver. This receiver produced higher brightnesses than the other CTI receivers and, as was to be expected, the line crawl was more noticeable. It can be expected that the development of tubes with long persistence phosphors would reduce the line crawl but to what extent is not known since no demonstration has been held and line crawl may very well be an inherent defect of the CTI line sequential system. Moreover, it should be noted that if the phosphor was of long enough persistence to eliminate the problem of line crawl, the effect on color fidelity and the portrayal of objects in motion would have to be carefully evaluated.

[fol. 139] 64. So far as continuity of motion is concerned, the CTI system produces no more than 10 color pictures per second. No problem was evident at the demonstrations as to continuity of motion but such demonstrations involved only pictures of low illumination.

3. *The CBS System*

65. The CBS system has a field repetition rate of 144 per second. However, the primary color repetition rate is 48 per second. It is this latter figure that is utilized in assessing the susceptibility of the system to large area flicker in color pictures. Why this is so can be illustrated by the situation where a scene is being scanned that has large areas of green in it—or any other single primary. When the field containing the green components is on the screen, the tube will be illuminated. The tube face will be relatively dark thereafter until the green field appears again in 1/48 of a second. Thus, in effect there is a repetition rate of 48 per second so far as flicker is concerned under the circumstances described above.[16]

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[16] When a black and white picture is shown, the susceptibility to flicker would probably be less than for a color picture.

66. CBS testified that the flicker in its disc type receiver became noticeable at 24 feet lamberts[17] (for a 7 to 1 viewing distance) and that flicker did not become objectionable until a higher figure of brightness was reached. Flicker is a physiological phenomenon that varies from person to person and hence is not capable of exact measurement. However, on the basis of the record, the Commission is able to find that flicker is not objectionable on the CBS disc type receiver up to highlight brightnesses of from 20 to 30 foot lamberts. The present black and white television system with a field rate of 60 has a flicker threshold many times that of the 24 foot lambert figure mentioned above, although there is serious doubt as to whether such highlight brightnesses are used by the public.[18] If tubes with long persistence phosphors were utilized, it would be possible to [fol. 140] increase brightness several fold with no flicker problem. A CBS witness testified that brightness could be increased to more than 100 foot lamberts without flicker, but it is not possible to predict the exact extent of such improvement without further testing. It should be noted, however, that there is a limitation on the use of very long

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[17] A foot lambert is the unit for measuring the brightness of light reflected from a surface.

[18] The only testimony on this subject was given by John V. L. Hogan, Vice-Chairman of JTAC, testifying as a witness for CBS, and T. T. Goldsmith of DuMont. Hogan's testimony was based upon a survey in stores of 75 new receivers of various makes which showed that only 0.7 of 1% of such sets had a highlight brightness reading of between 28 and 30 foot lamberts; the largest percentage was between 18 and 20 foot lamberts; and the average was 17. Goldsmith testified on direct examination that he had measured DuMont receivers and that 120 foot lamberts were typical. On cross examination, he testified that the average was 50 foot lamberts. The Commission does not believe that there is sufficient evidence in this record upon which to base a finding as to the level of brightnesses at which sets are operated in the home. Nor is it necessary that we do so because, as will be pointed out below (Paragraph 74) 20 to 30 foot lamberts are sufficient for disc type receivers and long persistence phosphors make higher brightnesses without flicker possible on other types of receivers.

persistence phosphors with a disc type receiver. To illustrate, when a field is scanned in red, the red filter is in front of the tube. In the next 1/144 of a second, the blue filter is in front of the tube. If there is still any substantial illumination left, it will merge with the illumination from the blue signal.

67. No problem of small area flicker was observed at any of the demonstrations on the record. However, if horizontal interlace were utilized, a certain amount of small area flicker might appear which can best be described as dot motion or twinkle. Since it is a flicker phenomenon, tubes with long persistence phosphors should minimize the problem. The magnitude of this flicker cannot be ascertained without further study.

68. As to continuity of motion, no problem was experienced at any of the demonstrations on the record.

4. *The RCA System*

69. The RCA system has 60 fields per second and its performance as to large area flicker is the same as the present system, so far as black and white pictures are concerned. So far as color pictures are concerned, insufficient evidence was offered as to whether the flicker characteristics are the same as for black and white pictures. There was no flicker observed at any of the demonstrations on the record, but it should be noted that the pictures had very low illumination.

70. At the demonstrations on the record small area flicker in the form of dot motion or twinkle has been observed. How serious a problem this is cannot be entirely ascertained at this time since the RCA demonstrations produced only a dim picture. With increase in brightness of the picture to the level necessary for home use, the effect will be accentuated, although it is possible that this effect may be overcome or minimized by the utilization of tubes with long persistence phosphors. The extent of such improvement cannot be determined without further testing. If the phosphor is of long enough persistence to reduce substantially the above defects, the effect on color fidelity and the portrayal of objects in motion would have to be carefully evaluated.

71. As to continuity of motion, no problem was observed at any of the demonstrations on the record with the low level of illumination present in the picture.

[fol. 141] C. *Brightness—Contrast*

1. *General*

72. Under the preceding heading we discussed the problem of brightness as it related to the question of flicker. In this part brightness will be considered from the point of view of adequacy—is the picture bright enough so as to give a sufficient contrast range [19] and so as to be capable of being viewed under normal home viewing conditions? There is no precise ratio for satisfactory contrast; it is a matter of choice with the individual viewer. In general, the wider the contrast range the better, since there is more flexibility for reproducing shades of gray in black and white pictures and shadings of color in a color picture. Based upon the demonstrations on the record, a contrast ratio of 30 to 1 for color pictures produces a very satisfactory picture.[20] However, with receivers operating in normally lighted rooms with brightnesses of the order indicated in the Hogan testimony, a much lower contrast ratio is achieved. The Commission has no reason to believe that these pictures are not satisfactory to the viewers.

2. *The CTI System*

73. At none of the demonstrations did any of the CTI receivers possess sufficient brightness. The highest measured brightness of a CTI receiver was 4 foot lamberts, although an RCA type of receiving equipment employing three tubes with dichroic mirrors was able to produce a brighter picture at the San Francisco demonstration. The CTI pictures were so dim that all CTI demonstrations had

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[19] The contrast range is determined by the ratio of brightness between the brightest and darkest portions of a picture. The brightest portion of the picture is determined by the amount of illumination which is produced by the scanning beam. The darkest portion is determined by the amount of light which the tube surface will reflect; the light in general comes from illumination in the room where the picture is being viewed.

[20] So far as black and white pictures are concerned, it is possible that a higher contract range is required since color by its nature gives contrast to a picture.

to be conducted in a room that was virtually dark. It should be noted that the failure to produce brighter pictures is undoubtedly due in large measure to the particular type of apparatus used and there is no reason to believe that the CTI system is incapable of generating much brighter pictures. However, as has already been indicated, higher brightnesses complicate the problem of line crawl which is already serious even at the low level of illumination demonstrated by the CTI system.

[fol. 142] 3. *The CBS System*

74. The amount of brightness which can effectively be utilized is determined by the flicker level. This figure is 20 to 30 foot lamberts on CBS disc receivers. The maximum figure achieved for a disc receiver at a demonstration on the record was 22 foot lamberts. We are of the opinion that the color picture so produced is bright enough and has sufficient contrast range to be entirely adequate for use in the home under normal viewing conditions. Indeed, the CBS demonstrations were the only ones that were conducted in a lighted room and during one of the demonstrations a light from a 300-watt lamp was thrown directly on the face of the receiver without seriously affecting the quality of the picture. This is possible because the disc operates as a two-way filter so far as illumination in the room is concerned; that is, any light that is reflected from the tube which originates in the room must pass through the disc on its way to the tube and the light that is so reflected must pass through the disc again on its way out. By way of illustration, if the disc utilized permits 10% of the light to pass through, filtering out 90%, it would be possible to view a 20-foot lambert picture on the CBS disc receiver in a room with an illumination of 67 foot lamberts and still retain a contrast ratio of 30 to 1.[21]

75. As was pointed out previously, higher brightnesses without flicker are possible in the CBS system by the utiliza-

[21] For a 20-foot lambert picture, the reflected light cannot exceed 2/3 of a foot lambert on a 30 to 1 ratio. If the ambient illumination at the receiver is 67 foot lamberts, this is reduced to 6.7 foot lamberts on the way through the disc to the tube and this in turn is reduced to 0.67 foot lamberts on the way out through the disc.

tion of tubes with long persistence phosphors. Tubes with long persistence phosphors cannot be utilized on disc receivers without a problem of color contamination, and the disc would not be present to serve as a filter. The viewer could have a neutral density filter on his receiver to improve contrast in the same way as on a black and white receiver.

4. *The RCA System*

76. At none of the demonstrations on the record did any of the RCA color receivers produce sufficient illumination for ordinary home use. Indeed, all of the RCA demonstrations on the record were conducted in a room with virtually no illumination. While equipment can undoubtedly be developed that will produce higher brightnesses, there is some doubt—which can be resolved only by further testing—as to whether the duty cycle of the RCA system will permit much higher brightnesses on the tri-color tube. Moreover, the RCA system has difficulty in maintaining adequate contrast, particularly in small areas. This defect appears to be due to the use of the mixed highs principle, cross talk and to the efforts made to smooth out the dots as much as possible so as to avoid the appearance of dot structure in the picture.

[fol. 143] D. *Superposition of Color Images*

1. *General*

77. There are three subjects covered by this heading: registration, color breakup, and color fringing. The problem of registration arises from the fact that since color television involves the transmission of three separate pictures in different colors, which are then combined into one color picture, it is apparent that the three separate pictures must have the same size and shape and must appear to lie directly one over the other if a satisfactory picture is to result. As can be seen, this must be so both for the electrical and optical components of each of the three pictures. When this is successfully accomplished, the pictures are said to be in "register" or the "registration" is satisfactory. Otherwise, registration is not satisfactory and both resolution and color fidelity are adversely affected.

78. Color breakup may occur when the eye moves while watching a color picture and causes the viewer to see the

separate primary colors. It is caused by the fact that successive fields occupy slightly different positions on the retina of the eye. Color fringing appears in the form of fringes along the edge of objects and it usually occurs when a rapidly moving object is televised in color.[22]

2. *The CTI System*

79. There is a severe registration problem at the camera and receiver. At the camera end the optical system must be so adjusted and maintained that the image being transmitted falls upon the three separate color bands of the tube in exactly the same relative position. Moreover, each color band must be so constructed and maintained that it will cause the electron scanning beam to generate signals of exactly the same linearity as the other two bands. For example, if an object an inch square were being scanned, if one band produced signals that reproduced the object as ⅞ of an inch, the second band an inch, and the third band 1⅛ inch, it is obvious that reduction in resolution and color distortion would result. At the receiver end, the same precise adjustments must be made. It is exceedingly difficult to construct equipment which is as precise and uniform in response as required for accurate registration. It is even more difficult to maintain the precision as time goes along, for the electrical component parts age. The difficulty of securing accurate registration is illustrated by the fact that there was evidence of faulty registration at every one of the CTI demonstrations held on the record. And this occurred when the equipment was in control of trained technicians. The results would undoubtedly eb much worse if the receivers were in a home, operated by untrained people, and had not been adjusted to optimum operating conditions just prior to the demonstration but had been in operation for a substantial period of time with no service adjustment.

[fol. 144] 80. Color breakup has not been observed at any of the demonstrations on the record; it does not appear to be a problem in a line sequential system. Color fringing has likewise not been observed so far as moving objects are concerned but line interlace causes color fringing on nearly

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[22] An effect similar to color fringing is caused by misregistration.

horizontal lines of other than primary colors. In addition, an effect similar to color fringing was apparent due to misregistration.

3. *The CBS System*

81. The CBS system is not troubled by other than minor registration problems either at the camera or receiver. These minor problems arise from power supply hum, stray fields, and vibration but they are easily cured. The reason why no fundamental registration problem exists is that only a single tube is utilized both at the camera and disc type receiver; the field sequential system is the only one that can do so.[23] Hence, the response of the scanning beam is the same for each color and each field. At none of the demonstrations on the record did the Commission observe any evidence of misregistration.

82. Color breakup and color fringing were observed at the demonstration on the disc receivers. The use of tubes with long persistence phosphors should minimize color breakup at the receiver. Color fringing, moreover, will still occur due to the use of the color disc at the camera.

4. *The RCA System*

83. Registration, both electrical and optical, is a severe problem both at the camera and receiver. At the camera this is due to the fact that three separate pick-up tubes are utilized. The optical system must be so adjusted and maintained that the image being scanned falls upon the three tubes in exactly the same relative position. Moreover, three separate electrical signals of exactly the same linearity must be generated. Even if equipment is originally constructed that could meet this test, it is extremely doubtful that such precision could be maintained. The rate of deterioration is likely to differ for each of the three tubes. The same problems are also present on the three tube receiver. RCA demonstrated a receiver employing a single tri-color tube in which it was claimed correct registration was built into the tube.[24] It should be noted, however, that

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[23] As will be pointed out later, if a tri-color tube is developed which can be utilized without the disc, it will have to have correct registration built into it to be capable of use.

[24] See Paragraph 53.

at all of the demonstrations on the record, there was evidence of faulty registration. This was also true of the demonstration on April 6 where the tri-color tube was shown. Of course, such misregistration may have been the fault of the camera rather than the receiver since a mis-[fol. 145] registered picture results if there is misregistration in either the optical or electrical aspects of the camera or receiver. Hence, even if the tri-color tube does have correct registration built into it, misregistration results at the receiver unless misregistration is corrected at the camera. The problem has not been solved by RCA at any of the demonstrations on the record when only indoor equipment was utilized. The problem by its nature is bound to be far more difficult in the case of outdoor pickups and RCA has not demonstrated any outdoor pickup camera. RCA did testify that a single tri-color tube could be developed for the camera which would have correct registration built into it. No such tube was demonstrated nor was there any testimony that one had been constructed. It is difficult for the Commission to see how the RCA system could utilize such a tube even if one were constructed. The principle of mixed highs upon which RCA relies so heavily requires by its very nature a simultaneous camera pickup of 3 color signals.

84. There should be no problem of color breakup or color fringing due to motion in the RCA system. However, faulty registration of pictures observed at the demonstrations produces an effect similar to color fringing.

E. *Color Fidelity*

1. *The CTI System*

85. At all of the demonstrations on the record, CTI had difficulty with color fidelity because of faulty registration. There was also difficulty in accurately reproducing skin tones. Moreover, the low levels of illumination at which the pictures were shown rendered difficult a judgment as to the quality of the color fidelity.

2. *The CBS System*

86. The color fidelity of the CBS system as demonstrated on the disc receiver has been of a uniformly high quality. No determination can be made on the record as to whether

receivers utilizing a direct view tri-color tube can achieve the same uniform high quality of color fidelity as disc receivers. This is due to the fact that there is no evidence in this record that color phosphor surfaces have been developed to the point where they produce colors as accurately as a filter, and also because a tube utilizing separate color phosphors loses the advantage of the use of a single viewing surface for all three colors.

3. *The RCA System*

87. At all of the demonstrations on the record, RCA had difficulty producing a color picture with adequate color fidelity.[25] The difficulty undoubtedly arises from several [fol. 146] factors which are part of the RCA dot sequential system. In the first place, registration is most difficult to maintain and when misregistration occurs there is color contamination and a loss in resolution. In the second place, color control is exceedingly difficult to maintain. A time error of only 1/11,000,000 of a second in the sampler, results in the wrong color being transmitted or received. In the third place, the utilization of mixed highs, cross talk, and the fact that the colored dots are larger than a single picture element appear to prevent the production of color detail in small areas over the entire picture. In the fourth place, the fact that the three primary color images are scanned on three separate surfaces at the camera, makes it exceedingly difficult to obtain uniform sensitivity for all colors over the whole picture area. The result was that color fidelity of a high quality was not consistently achieved at any of the demonsfrations on the record and in particular there was no real success in correctly reproducing skin tones. All of these difficulties will undoubtedly be aggravated on outdoor pickups as will be more fully explained in paragraph 118. So far as the tri-color receiving tube is concerned, the RCA picture also suffers from the limitations as to color fidelity which are involved in the use of color phosphors rather than filters.

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[25] Although there is some testimony that at times the color fidelity of the RCA picture was adequate, this was achieved either at a special demonstration not on the record, or sporadically on the record.

F. *Resolution*

1. *General*

88. Since a television picture is scanned line by line, it is apparent that the more lines per second that are scanned, the finer the vertical detail that can be portrayed. Hence, one of the methods commonly utilized to measure the definition capabilities of a system is geometrical resolution—the number of lines which the system can provide. In practice, resolution is determined by readings on a test pattern; vertical resolution is read on the horizontal wedges and horizontal resolution on the vertical wedges. These test patterns are principally of use in reading resolution of a black and white picture. For color pictures, an adequate test pattern must still be developed with wedges and lines in color. Besides resolution there are other factors which enter into the apparent definition of a picture, such as contrast, sharpness of the picture, etc. However, these are subjective factors and unlike resolution are not susceptible of ready measurement. Nevertheless, they are important and are the subject of consideration under the next heading. Moreover, color itself gives realism to pictures, affords better contrast, and thus improves apparent definition.

2. *The CTI System*

89. In theory the resolution of the CTI system should approach that of the present system. This has not been the case, for at none of the demonstrations on the record did CTI produce a picture which could compare in resolution with black and white television. The reason for this lies in the faulty registration which has been observed at each demonstration and in the line crawl which is present in the system.

[fol. 147]

3. *The CBS System*

90. The CBS system produces 405 lines per picture as compared with 525 lines per picture for the present system. Hence, as is to be expected, the vertical resolution of the CBS picture is below that of the present system. The use of 144 fields per second, with a resulting line scanning rate of 29,160 per second, results in a loss of horizontal resolution. There is a reduction in vertical resolution by

23% and horizontal resolution by 46% as compared with the present system. By utilizing horizontal interlace and retaining the horizontal scanning rate suggested by CBS, the vertical resolution would still be reduced by 23% but the horizontal resolution would be approximately the same as monochrome. Further testing is required in order to determine whether this increase can be achieved in practice.

4. *The RCA System*

91. Although the RCA system produces lines at the same rate as the black and white system, its resolution even in theory is not equal to that of the present system for all types of scenes. The vertical resolution should approach that of the present system but the horizontal resolution ranges between 67% and 100% of the present system. This is probably due to cross talk and the use of mixed highs. Moreover, if in the scene being scanned there are two adjacent areas of different colors which are of equal intensity, no mixed highs would be generated and in this type of situation the horizontal resolution could be reduced to as little as 33%. Finally, in practice, the RCA resolution has suffered from the misregistration which has been present at each of the demonstrations on the record.

G. *Picture Texture (Structural)*

1. *General*

92. Under the previous headings we have described the several qualitative aspects of a color television picture seriatim. Under this heading we will evaluate the over-all quality of the picture.

2. *The CTI System*

93. It is difficult to make a final judgment as to the picture texture of the CTI system since virtually all of the pictures were shown on a projection receiver at low levels of illumination. Projection receivers by their very nature produce "soft" pictures as compared with direct view receivers. However, in the CTI system line structure is prominently apparent in areas of red and green primary colors and line crawl is visible over the entire picture.

[fol. 448] 3. *The CBS System*

94. At all of the demonstrations on the record, the CBS picture compared favorably with the present system so far as contrast, sharpness of picture, and freedom from line structure are concerned. As above stated, the geometrical resolution of the CBS picture was inferior to a picture under the present standards.

95. During the course of the hearing there was a good deal of discussion concerning "crispening" in the CBS system, whereby apparent definition is improved by making the picture appear sharper. Crispening circuits do have the capacity of producing sharper pictures. While their use may not be limited to any one system, no demonstration of crispening was had with any of the other systems, and, accordingly, it is not possible to determine what the extent of improvement for these systems would be. Moreover, it is doubtful whether crispening can be utilized by a system employing horizontal interlace.

96. If horizontal interlace were utilized on the CBS system, the picture texture could be affected thereby. Dot structure or twinkle could appear in the picture. CBS testified that this could be avoided in its system utilizing horizontal interlace. Satisfactory proof of this point requires further testing.

4. *The RCA System*

97. The RCA picture has a "soft" quality when compared to pictures of the present system. This is probably due to the difficulty in maintaining contrast, particularly in small areas. Picture texture was also marred at all of the demonstrations on the record by the visibility of dot structure at distances at which the lines begin to be unresolved. RCA testified that the dot structure could be minimized by the use of electrical filters, but no demonstration of this process was made on the record. Moreover, it appears to the Commission that if the dots are smoothed out, the consequences are likely to be a loss in resolution or contrast, or in both.

[fol. 149] H. *Susceptibility to Interference*

1. *General*

98. The quality of a television picture can be marred not only by inherent defects but also by interference. The sources of interference include not only television signals from other stations on the same or adjacent channel but also ignition systems, diathermy, oscillator radiations from other receivers, etc. So far as co-channel interference is concerned, a process known as offset-carrier operation gives promise of reducing the effects of interference. The process will be fully explored in subsequent phases of this hearing but enough evidence was introduced on the subject in the color phase of the hearing to warrant consideration so far as susceptibility of the three systems to interference is concerned.

2. *The CTI System*

99. In general, the CTI system appears to have the same susceptibility to interference as the present system. However, no evidence was introduced concerning offset-carrier operation on this system. There is some reason to believe that the CTI system would not derive as much benefit from offset-carrier operation as would black and white television or the other two color systems because there is likely to be a coarse beat between system line structure and offset line structure.

3. *The CBS System*

100. The CBS system has about the same susceptibility to interference as the present system for both normal operation and offset-carrier operation. If horizontal interlace is utilized, the system may be susceptible to oscillator radiation and other forms of continuous wave interference. CBS testified that its system with horizontal interlace would not be susceptible to this type of interference but had no demonstration which proved the point. The Commission believes that further testing is necessary before the CBS contention can be accepted.

4. *The RCA System*

101. With the exception noted below, the RCA system has about the same susceptibility to interference as does the present system, both for normal operation and offset-carrier operation. The exception is in the case of oscilla-

tor radiation and other forms of continuous wave interference where a greater susceptibility to interference exists than for the present system or the other two color systems. This is caused by the presence of the sampler synchronizing pulse and the color subcarrier which are not present in the black and white system or the other two color systems. A demonstration of oscillator radiation such as would be received from other television receivers not only caused severe interference to the picture but under certain conditions upset color synchronization so that color control was lost.

[fol. 150] I. *Adaptability and Convertibility*

1. *General*

102. The Commission's Notice of Further Proposed Rule Making in these proceedings provided that proposals for changes in transmission standards so as to provide for color television would be considered only if a showing were made, inter alia, that:

> "Existing television receivers designed to receive television programs transmitted in accordance with present transmission standards will be able to receive television programs transmitted in accordance with the proposed new standards simply by making relatively minor modifications in such existing receivers."

It is not entirely clear from a reading of the language itself as to whether the above requirement is directed to the changes in existing receivers necessary to enable them to receive color programs in black and white, or in color, or in both. However, it does appear to be clear from a reading of the above provision in the context of the entire notice that it covered both requirements. In a proceeding involving a possible change of standards where several million receivers were already in the hands of the public it was obviously important to ascertain the changes that would be required to enable existing black and white receivers to continue receiving pictures in black and white and also the changes necessary to enable them to receive the new color pictures in color. The parties themselves must have construed the notice in the same way since they addressed themselves to both facets of the problem.

103. At the hearing, some dispute developed concerning the appropriate words to be utilized in describing each facet of the problem. In order that there should be no ambiguity as to the meaning of the words as utilized in this Report, the word "adaptability" will be utilized to cover the changes that are required to enable existing receivers to receive a black and white picture from color transmissions, and the word "convertibility" will be utilized to cover the changes that are necessary to enable existing receivers to receive color transmissions in color. The word "compatibility" covers the specialized case of adaptability where no change whatsoever is required in existing receivers in order to enable them to receive a black and white picture. No correlative term is employed so far as convertibility is concerned since no system was proposed where existing receivers without making any changes whatsoever could receive color transmissions in color.

[fol. 151] 2. *The CTI System*

104. No change whatsoever is required in existing receivers in order to enable them to receive a black and white picture from CTI color transmissions. However, the picture so received is substantially inferior in quality to a regular black and white picture. This is due to the prominent line structure, jitter, and line crawl which are present in the CTI system. As to convertibility, CTI does not contend that as a practical matter existing receivers can be converted to receive color transmissions in color.

3. *The CBS System*

105. Existing receivers are unable to receive a black and white picture from CBS color transmissions without making some changes in the receivers to enable them to handle the different vertical and horizontal scanning rates. These changes may be made either by rewiring the circuits, or by attaching an external adapter. CBS presented evidence from manufacturers experienced in the field indicating that the retail price of external adapters, exclusive of installation charges, would range from $32 to $50, and that adaptation may be accomplished by rewiring the circuits at a somewhat lower price; automatic switching from 525-line monochrome to 405-line CBS transmissions could be

effected at an additional cost of about $5 to $15.[26] Testimony was also introduced concerning the adaptation by the Commission's laboratory of four conventional 7-inch and 10-inch receivers. Parts for the conversions—at a cost level somewhere between retail prices and manufacturer's prices—ranged from about $4 to $12, the higher figure including automatic switching; labor and installation costs would be extra. Philco gave a list price of $45 to $50 for an external adapter, with other changes in the receiver and various unitemized costs bringing the total cost to between $75 and $100; and DuMont estimated the total cost to be between $100 and $125. The Philco and DuMont estimates appear to be unreasonably high in the light of the cost of the parts required for adaptation, and seem to have been based on the replacement of major parts rather than on the minimum necessary changes.[27]

106. Existing receivers can be converted to enable them to receive CBS color transmissions in color by the addition of an adapter to change the scanning rates and a rotating color filter disc; a magnifying lens may also be added to increase the picture size. Based upon evidence offered by independent manufacturers called as CBS witnesses, the retail price of adapting and converting an existing 7-inch tube receiver to CBS color to provide a 10-inch picture (magnified) would range from $95 to $130. Likewise, a 10-inch tube set could be adapted and converted to provide a 12½-inch picture (magnified) for from $110 to $150, and a 12½-inch set to provide a 16-inch picture (magnified) for from $125 to $170. Since the rotating disc must be [fol. 152] placed in front of the cathode-ray tube, some existing receivers with doors or recessed tubes would, in practice, be difficult to convert. As will be explained in Paragraph 111, on receivers with direct view tubes larger

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[26] The figures quoted in this paragraph refer to external adaptation for existing receivers. The cost of building the necessary additional circuits into a new receiver at the factory to permit it to receive CBS transmissions is substantially lower.

[27] For example, the DuMont estimate included the following items: Sweep conversion unit, $80, different yoke and transformer, $15, and service charge, transportation, etc., $25. Philco did not supply a similar cost breakdown as applied to its estimates.

than 12½ inches, the color pictures will be reduced to 12½ inches unmagnified or up to 16 inches magnified. Philco and DuMont indicated that the cost of conversion would be much higher than indicated above but the Commission is unable to accept their estimates for the reasons set forth in the preceding paragraph.

4. *The RCA System*

107. No change whatsoever is required in existing receivers in order to enable them to receive a black and white picture from RCA color transmissions. However, the picture so received is somewhat inferior to present black and white pictures which may be due to the appearance of dots in the picture and to misregistration at the camera. So far as convertibility is concerned, no practical converter was demonstrated at any of the demonstrations on the record.

J. *Equipment Considerations*

1. *The CTI System*

108. At the present time, apparatus in the CTI system is limited to projection receivers. In black and white television, projection receivers have not had widespread acceptability in the market. The CTI receiver is bound to be more complex than present receivers principally because of the difficulty of maintaining image registration. The control for this purpose is very critical and in its present stage is beyond the capabilities of the average viewer under normal home viewing conditions, as is evident from the fact that even trained technicians were unable to maintain accurate registration throughout any one of the demonstrations that were held on the record.

109. At the station, no change is required in the transmitter or antenna to broadcast CTI color. Extensive changes are required in the camera and associated studio equipment. Based upon CTI's estimates the cost of converting a single existing studio camera chain is about $7,000. Moreover, this equipment is likely to be quite complex since very critical tolerances must be achieved and maintained if registration is to be accurate. This means complex and expensive equipment to begin with; costly maintenance work to keep the critical parts of the equipment in perfect operating condition; and frequent re-

placement of expensive tubes when they start to deteriorate at an uneven rate. These difficulties are the ones that will be encountered in studio equipment. So far as equipment for outdoor pickups is concerned, none was demonstrated by CTI. The difficulties here are even more pronounced than for studio equipment since such equipment must be capable of being moved about from one spot to another and it is subjected to varying conditions.

[fol. 153] 110. So far as networking is concerned, no special problems are presented. The present inter-city facilities of common carriers are either radio relays which are capable of a 4-megacycle response or coaxial cables which are capable of a 2.7 megacycle response. CTI color programs can pass over either type of facility. Of course, a CTI color program which is transmitted over a 2.7 megacycle cable suffers a reduction in horizontal resolution in the same way as does a black and white picture.

2. *The CBS System*

111. At the present time, the apparatus in the CBS system is limited to projection receivers or to color pictures (unmagnified) of approximately 12½ inches on a direct view tube in a disc type receiver. The limitation on direct view tubes in disc receivers arises from the fact that the diameter of the disc must be at least twice that of the tube. It is not practical to have a disc much larger than 26 inches in diameter in the home. Receivers can be made with tubes larger than 12½ inches and the full surface of the tube can be utilized to view black and white pictures; the disc folds aside when black and white pictures are being received. For such larger tubes, the picture must be reduced to no more than 12½ inches when a color picture is being viewed. Of course, the viewer may, if he chooses, utilize a magnifying lens to increase the 12½ inch picture to 16 inches. Magnifying lenses have not been popular in black and white receivers since they severely restrict the viewing angle and are susceptible to annoying specular reflections from lights in the room. According to testimony of manufacturers called as CBS witnesses, new combination black-and-white and CBS disc-type color receivers could be sold at a retail price of approximately $200 for a 7-inch tube magnified to 10 inches, and approximately $300 for a 10-inch tube magnified to 12½ inches. DuMont testified that a new combination black-and-white and CBS disc receiver, using

a 12-inch tube (without magnification) could sell for $500 to $600 based on an annual production of 100,000, compared to $329 for a DuMont black-and-white set of similar quality.[28]

112. The operation of the CBS disc type receiver is relatively simple. Since CBS proposes that the present monochrome standards be retained for black and white pictures, a manual or automatic switch is necessary to handle the monochrome standards for black and white pictures and the CBS standards for color pictures. When the viewer desires to tune in a color program, he turns a switch which operates the adapter and also turns on the motor which turns the disc. As soon as the motor reaches full running speed, the viewer presses a button that is designed to make sure that the particular color filter in front of his tube is [fol. 154] the same color as the one before the camera; this can be done by inspection. One or two pushes of the button are necessary for this purpose.[29] When this is done, nothing further need be done. As can be seen, color control is quite simple and it is not at all critical. The color switching is accomplished at the relatively slow rate of 144 times per second, and hence receivers for the CBS system are relatively simple. Since two different standards of transmission are provided under the CBS proposal for black and white and color, it is apparent that broadcasters cannot readily change from color to black and white or vice versa

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[28] RMA Exhibit 408, entitled "Time Availability and Cost of Apparatus Necessary for Color Television," consists of replies by various manufacturers to a letter from Dr. W. R. G. Baker, Director of RMA Engineering Department, which he sent to all 54 members of the RMA Set Division. Dr. Baker testified that "I didn't recommend that they (the Commission) give serious consideration to this exhibit, if I remember rightly. I said this was a very rough approximation and I explained in detail why." The Commission has not given this exhibit serious consideration not only because of Dr. Baker's stat-ment, but also because no supporting data were submitted with respect to the above cost estimates, and most of the manufacturers submitting estimates did not appear to testify concerning them and were not available for cross-examination.

[29] See Paragraph 44 for reference to automatic color phasing shown at the Laurel demonstration.

(e.g. a black and white program with color commercials) during the course of a program.

113. At the station, no change is required in the transmitter or antenna. The camera and associated equipment do require changes and CBS submitted evidence that an existing studio camera could be converted for $3,622 and that CBS had brought a new color camera chain from RCA for approximately $27,000. The use of the disc in the camera presents no problem since camera tubes are relatively small in diameter. The color controls in the CBS camera are not critical and CBS successfully demonstrated on the record outdoor pickups as well as studio performances.

114. So far as networking is concerned, CBS color pictures can be transmitted over the radio relay or coaxial cable. The coaxial cable reduces the horizontal resolution in the same manner as black and white pictures.

3. *The RCA System*

115. At none of the demonstrations on the record was a practical RCA home receiver shown. The projection receivers shown at the first demonstration were withdrawn by RCA and not resubmitted. The direct view receiver consisting of dichroic mirrors and three kinescopes is so bulky, so complex, and so expensive that it could not be seriously considered for home use. The controls are so critical that even trained technicians were unable to maintain correct registration and color fidelity throughout a single demonstration on the record.

116. RCA showed a tri-color tube at the demonstration on the record held April 6, 1950. Even at that demonstration, there was evidence of faulty registration, although it does not appear whether such misregistration was due to the receiver or camera, or both. Since color control is extremely critical in the RCA system, there can be no assurance that the fault does not exist at both ends. Moreover, there is no assurance on the record that the tube is an assured fact.[30] The tube was demonstrated towards the

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[30] RCA testified that within 60 to 90 days from May, 1950, it expected to have developmental model color receivers using the tri-color tube available for field tests; during

[fol. 155] close of the hearing and has had very little field testing. It has not been made available to other parties or to the Commission's laboratory for study. An RCA witness testified that the tube would cost about 50 to 100 percent more than black and white tubes of similar size at the same relative stage of development; no data were submitted in support of this estimate. Finally, as demonstrated, the tube developed insufficient illumination, it had an inadequate number of dots, and it had a serious moire pattern in it.

117. In any event, RCA color receivers are expected to be more complex than receivers of the other two systems. Since a time error of only 1/11,000,000 of a second adversely affects color fidelity (see Paragraph 87), many of the components must be built to a very critical tolerance. Moreover, since RCA utilizes a subcarrier of 3.6 megacycles for the purpose of carrying its color information, receivers must be built with a band pass of at least 3.6 megacycles. Many of the cheaper receivers today are built with a band pass narrower than 3.6 megacycles. Early in the proceedings RCA demonstrated projection and direct view color receivers. An RCA witness testified that a 10-inch direct view three tube set would cost between $650 and $800; a 7-inch by 9½-inch projection receiver would cost between $550 and $700; a 15-inch by 20-inch projection receiver would cost between $800 and $1000; and a two color direct-view 10-inch receiver would cost between $400 and $550. As was indicated above, the projection receivers and two-color receivers shown at the first demonstration were not demonstrated again by RCA. With respect to receivers containing a tri-color tube, an RCA witness testified that the set itself aside from the tube was likely to be between 25 to 50 percent more expensive than a black-and-white receiver of the same size and character, and that the tube itself was likely to be between 50 and 100 percent more expensive than black and white tubes of similar size.

118. At the station no change is required in the transmitter or antenna. Extensive changes are required in the

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September, 1950 5 or 6 such receivers would be produced each week from a pilot assembly operation. Factory production at a weekly rate of 200 receivers would begin by June, 1951 if RCA standards were adopted, and by the end of 1951, the rate would be 1000 per week.

camera and associated equipment. RCA admitted that existing camera equipment cannot be converted. It estimated that the cost for new RCA color studio camera equipment would be $54,440. This would include one camera chain, the necessary 3-image orthicons, a pedestal, a friction head, a flag burst generator, crystal standard, power supply and cabinet rack, a color monitor, and power supplies for the monitor. An additional color camera would cost $26,750. Moreover, the equipment is likely to be very complex since extremely critical tolerances must be achieved and maintained. This means complex and expensive equipment to begin with. It also means costly maintenance work to keep the critical parts of the equipment in precise operating condition and frequent replacement of expensive tubes when they start to deteriorate at an uneven rate. The difficulties are compounded so far as outdoor pickup is concerned, which RCA did not demonstrate on the record. Outdoor equipment must be capable of being moved around from spot to spot and is subjected to varying conditions.

[fol. 156]

119. So far as networking is concerned, radio relays have a response to 4 megacycles and would handle RCA color transmissions. The coaxial cable has a response of 2.7 megacycles and, accordingly, RCA color transmissions come through the coaxial cable as black and white pictures with reduced horizontal resolution. At the April 6, 1950 demonstration on the record, RCA simulated a color transmission over the coaxial cable by utilizing a frequency limiting circuit. To accomplish this, the signal was originally sampled at a 3.6 megacycle rate and then before going into the circuit that simulated the cable, it was resampled at a 2.4 megacycle rate. When it comes off the cable, it is again resampled at the 3.6 megacycle rate. In the demonstration, a color picture was received, with reduced horizontal resolution. This process would require extra terminal equipment on the cable not required for CTI or CBS color transmissions. Further testing on the cable itself is required before a final judgment can be made.

[fol. 157]

IV. Conclusions

A. *General*

120. The testimony and demonstrations in these proceedings leave no room for doubt that color is an important

improvement in television broadcasting. It adds both apparent definition and realism in pictures. It opens up whole new fields for effective broadcasting, rendering lifelike and exciting scenes where color is of the essence—scenes which in black and white television are avoided or, if telecast, have little appeal.

121. Because color is such a fundamental improvement in television, the Commission is of the opinion that in establishing standards, a system must be chosen that produces a satisfactory color picture and is capable of operating through apparatus that is simple to operate in the home and is cheap enough in price so as to be economically available to the great mass of the American purchasing public. The Commission is of the firm opinion that it would not be in the public interest to establish a television system where only black and white receivers are cheap enough for the great mass of the American people and color television is available to those who can afford to pay luxury prices.

122. In order for a color system to be considered eligible for adoption, it must meet the following minimum criteria:

a. It must be capable of operating within a 6-megacycle channel allocation structure.

b. It must be capable of producing a color picture which has a high quality of color fidelity, has adequate apparent definition, has good picture texture, and is not marred by such defects as misregistration, line crawl, jitter or unduly prominent dot or other structure.

c. The color picture must be sufficiently bright so as to permit an adequate contrast range and so as to be capable of being viewed under normal home conditions without objectionable flicker.

d. It must be capable of operating through receiver apparatus that is simple to operate in the home, does not have critical registration or color controls, and is cheap enough in price to be available to the great mass of the American purchasing public.

e. It must be capable of operating through apparatus at the station that is technically within the competence of the type of trained personnel hired by a station owner who does not have an extensive research or engineering staff at his disposal and the costs of

purchase, operation, and maintenance of such equipment must not be so high as unduly to restrict the class of persons who can afford to operate a television station.

[fol. 158] f. It must not be unduly susceptible to interference as compared with the present monochrome system.

g. It must be capable of transmitting color programs over inter-city relay facilities presently in existence or which may be developed in the foreseeable future.

123. It should be noted that the above criteria do not include compatibility. The Commission is of the opinion that if a satisfactory compatible system were available, it would certainly be desirable to adopt such a system. Compatibility would facilitate for the broadcaster the transition from black and white broadcasting to color broadcasting and would reduce to a minimum the obsolescence problem of present receivers. However, as will be developed more fully later on in this Report, no satisfactory compatible system was demonstrated in these proceedings and the Commission is of the opinion, based upon a study of the history of color development over the past ten years, that from a technical point of view compatibility, as represented by all color television systems which have been demonstrated to date, is too high a price to put on color. In order to make these systems compatible, the alternatives have been either an unsatisfactory system from the standpoint of picture quality, or a complex system, or both. A complex color system will have such formidable obstacles in its path that there is no assurance it would be acceptable to the American public. The Commission is compelled to reach the conclusion that no satisfactory compatible color system has been developed.

124. The receiver aspect of compatibility, moreover, is merely a temporay problem which will decrease progressively each year once receivers are built incorporating new standards. Based upon an assumption of 7,000,000 sets in the hands of the public at the present time, the problem of compatibility would be diluted each year depending on the annual rate of production. It is not possible to forecast what the annual rate of production would be, but, by way of illustration, if sets were continued to be manufactured at the present rate of production (e.g., five

to six million sets a year) then one year after the adoption of an incompatible system approximately 40% of the receivers in the hands of the public should be capable of receiving these signals without any change whatsoever—they will have been built that way.[31] The percentage will become progressively larger each year. So far as owners of existing receivers are concerned, if they make no change, they will still be able to receive programs broadcast in accordance with present monochrome standards—there will undoubtedly be such for several years after a decision—or they can spend the relatively minor amount of money necessary to adapt their sets and thus be able to receive all programs in black and white or they can spend a slightly larger amount and get color programs in color. It would not be in the public interest to deprive forty million American families of color television in order to spare the owners of seven million sets the expense required for adaptation.

[fol. 159] 125. The criteria set forth in Paragraph 122 likewise do not include any reference to convertibility or adaptability. Much of the reasoning applicable to compatibility applies likewise to convertibility or adaptability. While there is some doubt as to whether some of the color systems proposed here meet the test of adaptability and convertibility (as defined in Paragraph 103) contained in our Notice of July 11, 1949, no objection was raised by the Commission or any of the parties to the consideration of any of the color systems proposed herein and no objection is raised in any of the Proposed Findings or Replies. Accordingly, the three systems are considered on the merits.

126. During the hearing evidence was introduced to show the patent position which is held by RCA in the television field, and one of the parties urged the Commission to reject the RCA system in order to encourage competition and avoid monopoly. The Commission recognizes that if a monopolistic patent position exists in the radio field, it would tend to discourage fundamental research by other

[31] The Commission is aware that some manufacturers expressed a reluctance to build sets for an incompatible system if it is approved by the Commission. We believe that an informed public would demand receivers that are capable of getting programs from all television stations in the area and that the manufacturers would build such receivers.

companies and would tend to foster concerted action on the part of the patent licensor and its licensees, which could result in control of receivers sold to the public. However, on the record in these proceedings we do not believe that we are called upon to make a decision as to whether RCA does have a monopolistic position in the radio field, as urged by some, or merely one of leadership, as contended by RCA, because the decision as to whether the RCA system should or should not be adopted is based solely on a consideration of the system on the merits. If the Commission should find that a monopolistic situation does exist or such a situation should develop, appropriate proceedings can be instituted under the anti-trust laws or the Commission can seek from Congress legislation to prevent the building of monopolistic patent structures in the radio field, or both.

B. *The CTI System*

127. The Commission is of the opinion that the CTI system falls short of the criteria we have established for a color system. In the first place, the quality of the color picture which the CTI system produces is not at all satisfactory. There is a serious line crawl problem and the picture texture is not satisfactory. These defects were clearly evident at the demonstrations on the record at the low levels of illumination there used. With the higher illuminations that would be required for home viewing, the defects would be more pronounced. Improvements in apparatus will in all probability not eliminate these defects since they appear to be inherent in the CTI line sequential system.

[fol. 160] 128. In the second place, there is great doubt as to whether CTI even qualifies on what it claims to be one of its principal advantages—compatibilty. There is a serious degradation in quality of the black and white pictures which existing receivers get from CTI color transmissions. While the Commission would not rule out an otherwise satisfactory color system merely because some degradation resulted in the black and white pictures which existing sets would receive from the color transmissions, a serious problem would be presented where the degradation is as substantial as in the case of the CTI system.

129. In the third place, the equipment utilized by the CTI system is unduly complex. At the receiver, image regis-

tration control is so critical that it is entirely unlikely that the average person could successfully operate it. At the station end, the equipment is likewise so complex that even though trained personnel would be available, it is most doubtful that they could maintain the equipment in the precise operating condition that is necessary for the system for a regular broadcast operation. This difficulty will be particularly onerous in the case of outdoor pickup equipment which is subject to much harder use and rougher handling than studio-equipment. CTI did not demonstrate any outdoor pickup equipment.

130. In the fourth place, CTI did not offer sufficient evidence on which a finding could be based as to whether the system is unduly susceptible to interference. While the evidence introduced does indicate that the system has approximately the same susceptibility to interference as the present monochrome system so far as normal operation is concerned, no evidence was offered concerning offset carrier operation and there is reason to believe that the CTI system would not derive as much benefit from offset carrier operation as the present monochrome system or the other two color systems.

131. So far as networking is concerned, CTI color transmissions are capable of being relayed over both coaxial cable and microwave relays.

C. *The RCA System*

132. The RCA system also falls short of the criteria set forth above. In the first place, the color fidelity of the RCA picture is not satisfactory and it would obviously not be in the public interest to adopt as standard a color system which does not produce a satisfactory color picture. At none of the demonstrations on the record could RCA consistently produce pictures with adequate color fidelity. The inability accurately to reproduce skin tones is a particularly serious handicap. There appears to be no reasonable prospect that these difficulties in the RCA system can be overcome, because of misregistration, mixed highs, cross talk between picture elements, and criticalness of color control implicit in a system where a time error of 1/11,000,000 of a second results in color contamination.

[fol. 161] 133. In the second place, the texture of the color picture is not satisfactory. At all of the demonstra-

tions the quality of the picture was marred by misregistration and also to a certain extent by dot structure. Indeed, even on the score of compatibility the quality of black and white pictures which existing sets receive from RCA color transmissions is somewhat degraded because of dot structure and misregistration at the camera; however, the black and white picture remains of reasonably good quality. Moreover, the RCA color picture has a "soft" quality, probably due to the difficulty in maintaining contrast, particularly in small areas. It is difficult to see how these defects can be eliminated. Correcting misregistration in the RCA system is an exceedingly difficult task as has already been indicated. Smoothing out the dot structure can mean losing resolution or contrast, or both. Poorness of contrast, particularly in small areas, appears to be the price of mixed highs, cross talk, and dots which are larger than single picture elements.

134. In the third place, the receiving equipment utilized by the RCA system is exceedingly complex. The Commission would certainly not consider adopting a system which was limited to receivers of the dichroic mirror type demonstrated on the record. These receivers are so bulky, so complicated, so difficult to operate, and so expensive that it is inconceivable that the public would purchase them in any quantity. RCA did demonstrate a receiver using a direct view tri-color tube towards the end of the hearing but the Commission is not satisfied that the tube solves the problem of complex receivers. The tube was not demonstrated until late in the proceedings and has had very little field testing. It has not been available to other parties or the Commission's laboratory for the purpose of checking its operation. As demonstrated, the tube had an inadequate number of dots, produced insufficient illumination, and had a serious moire pattern in it. There is no assurance that the tube will not be unduly expensive, for while an RCA witness testified that the tube would cost 50 to 100 percent more than black and white tubes of corresponding size, no data were submitted in support of this estimate. Finally, even though the tube is developed, there is no assurance that the receivers will not continue to be unduly complex and difficult to operate. Since a time error of 1/11,000,000 of a second results in color contamination, it is difficult to see how color control can be simplified to a sufficient extent for home use.

135. In the fourth place, the equipment utilized at the station is exceedingly complex. There is no assurance that satisfactory commercial type equipment can be built because at not a single demonstration on the record was accurate registration maintained throughout the demon-[fol. 162]-stration. Moreover, there is such great difficulty in maintaining the equipment in the precise operating condition which the system entails that it is extremely unlikely that the job could be done by an organization that does not have an extensive staff of research personnel and engineers at its disposal. The type of trained personnel which is generally available to the average station could hardly be expected to handle such a difficult job. The above difficulties will be particularly onerous in the case of outdoor pickup equipment which is subject to much harder use and rougher handling than studio equipment. RCA did not demonstrate any outdoor pickup equipment.

136. In the fifth place, the RCA color system is much more susceptible to certain kinds of interference than the present monochrome system or the other two color systems. A demonstration of oscillator radiation such as would be received from other television receivers not only caused severe interference to the picture but under certain conditions upset color synchronization so that color control was lost.

137. So far as networking is concerned, RCA color transmissions can be handled by inter-city relays with 4-megacycle capacity but there is not adequate assurance on this record that color pictures can be transmitted over the 2.7 megacycle coaxial cable facilities. On this point, the common carriers who testified at the hearing indicated that they are progressively increasing the percentage of their inter-city facilities which are represented by microwave relays. Moreover, the coaxial cable is capable of being modified to accommodate 4 megacycle television transmissions. The Commission expects the common carriers to have 4 megacycle facilities for all television programs as soon as possible so that the public will not be required to accept network programs which are substantially degraded in horizontal resolution.

138. Finally, the RCA system has not met the requirements of successful field testing. The system introduces entirely new techniques into broadcasting, principally dot sampling and the use of mixed highs. Extensive field test-

ing is required before a final answer can be given as to the value of these techniques. The Commission is still of the same view today as it was in March 1947 when it rejected the former CBS color system—a much simpler system and one which had more field testing than the RCA system. At that time, it stated:

> "Before approving a new system of television it is indispensable that there be an adequate program of field testing. Receivers and transmitters must be subject to numerous tests over a long period of time and at a diversified set of locations and operating condi- [fol. 163] tions so that operation under average home conditions is closely approximated. Without such field testing, there is no assurance that all fundamental defects have been eliminated. There is a great difference between the performance of a system in a laboratory with trained personnel and its operation in the home by the average citizen. In the history of electronics there have been developments which looked promising in theory and even in operation in the laboratory but which revealed such fundamental defects when subjected to adequate field testing that they had to be abandoned entirely."

RCA has not successfully shown that its equipment is simple enough to be operated by the average individual; the testimony of a trained expert that it can be done is not a satisfactory substitute.

139. In ruling out the RCA system, the Commission has not overlooked the testimony of the many radio manufacturers who directly, and through their trade association, endorsed the dot sequential system. The Commission is aware that of necessity it must rely to a great extent upon industry experts for data and expert opinion in arriving at decisions in the field of standards; our own facilities are too limited to gather much of the data. However, the responsibility for decision is that of the Commission and we cannot feel bound to accept recommendations and expert opinions when we find from a study of the record that the record supports different conclusions. Moreover, the testimony of many of the parties was not based on field testing conducted by them or upon an analysis of field testing made by others but were simply recommendations and expert

opinions of a general nature. In weighing these recommendations and expert opinions we cannot overlook the fact that many of these same parties offered recommendations and expert opinions of the same kind as the basis of their advocacy in the 1946-1947 hearing of the simultaneous system—a system which never survived field testing.

D. *The CBS System*

140. This leaves for consideration the CBS system. In the Commission's opinion, the CBS system produces a color picture that is most satisfactory from the point of view of texture, color fidelity and contrast. The several demonstrations on the record included a wide variety of subject matter both in the studio and out of doors and the picture which resulted was in each case entirely suitable for home viewing purposes.

141. Receivers and station equipment are simple to handle. They have been subjected to use in widely diversified circumstances and no difficulty has been encountered. The receivers are simple and when produced on a mass marketing basis, should be within the economic reach of the great mass of purchasing public.

[fol. 164] 142. The susceptibility to flicker in the CBS system is greater than in the present monochrome system but in the Commission's view the brightnesses that have been achieved on disc receivers are adequate for home use and the evidence concerning long persistence phosphors shows that there is a specific method available for increasing brightness on non-disc receivers with no objectionable flicker. The CBS system is subject to color fringing or color breakup under certain circumstances. This is not a serious obstacle for two reasons. In the first place, many viewers after awhile tend not to see these defects. This is evident from a comparison of the little amount of comment on this subject in this hearing, compared to the 1946-1947 hearing. In the second place, these effects occur rather infrequently and many of them can be minimized by programming techniques. When they do occur, they are no more annoying to the viewer than stroboscopic effects in motion pictures.

143. The CBS system has less geometric resolution than the present monochrome system but the addition of color more than outweighs the loss in geometric resolution so far

as apparent definition is concerned. Of course, owners of receivers which have adapters but which are not built for color will receive only a black and white picture from CBS color transmissions—a picture which will not have color to compensate for the loss in resolution. However, this is a matter of choice for the viewer; he can have color if he so desires. Moreover, the black and white picture he receives from CBS color transmissions is still an acceptable picture; the degradation is of the order involved when black and white pictures are transmitted over the coaxial cable. There appears to be no alternative to some degradation in the quality of the black and white picture from color transmissions since even the so-called compatible systems suffer from the same failing.

[fol. 165] 144. At the present time, the CBS system i as a practical matter, limited to projection receivers or direct-view tubes of no greater size than 12½ inches (which can be magnified to 16 inches). Projection receivers have not had widespread public acceptability and the trend in direct-view receivers is to tube sizes larger than 12½ inches. The tri-color tube demonstrated by RCA is not limited to 12½ inches and RCA witnesses as well as other witnesses agreed that the tri-color tube could be utilized on the field sequential system. The Commission has no doubt that this is so, if the tube is successfully developed. However, at the one demonstration on the record when such a tube was shown—the RCA demonstration of April 6, 1950—the pictures were not in correct registration. It was not possible to determine whether the registration difficulties were at the camera or in the tri-color tube, or both. Since accurate registration has proved exceedingly difficult to achieve at the receiver as well as at the camera in the RCA system, the Commission is unable to conclude on the basis of this record that a successful tri-color tube has been devised with correct registration built into it. Moreover, the RCA tube as demonstrated had inadequate resolution, insufficient brightness, and a serious moire pattern in it. Finally, we are not certain that the color fidelity of a tri-color tube is of sufficiently high quality for a broadcast service.

145. Since there was no demonstration on the record of a direct view tri-color tube on the CBS system, the record does not contain a definitive answer as to whether direct-view tubes larger than 12½ inches are possible with the CBS system. Thus two difficult courses of action are open

to the Commission. The first course of action is to reopen the record and to have a demonstration on the record wherein a tri-color tube or other technique for displaying large size direct-view pictures could be tried out on the CBS system. The second course of action is to adopt a final decision now promulgating color standards on the basis of the CBS system with the confidence that since the radio industry has succeeded in creating much larger tube sizes than those demonstrated in 1941 when standards for black and white television were adopted, they would succeed in building apparatus that would eliminate the present limitation in the CBS system as to size of direct view tube.

146. The advantage of the first course of action is that the Commission would not be compelled to speculate as to an important basis for its decision but would have a definitive answer on the basis of which to act. The disadvantage is that it would postpone a final decision and hence would aggravate the compatability problem. The time already devoted to this hearing has magnified the problem. The advantage of the second course of action is that — would bring a speedy conclusion to the matters in issue and would furnish to manufacturers a real incentive to build a successful tri-color tube as soon as possible. A real competitive advantage would accrue to the company that succeeded in bringing out such a tube. The disadvantage is that the Commission's determination on an important part of its decision would be based on speculation and hope rather than on demonstrations.

[fol. 166] 147. Three other matters present the Commission with the same difficult choice between the two courses of action referred to above. Two developments were demonstrated in this hearing which hold real promise for increasing definition both in color and black and white pictures. One is horizontal interlace and the second is the efficacy of long persistence phosphors in reducing flicker, thus providing the means for decreasing the field rate and increasing the number of lines in the picture. Both of these techniques require further testing and, if successful, may make desirable additional changes in the field and line repetition rate.

148. The third matter we refer to is the possibility of new color systems and improvements in existing color systems which have been informally called to our attention since the hearings closed. Of course, these are not matters

of record and cannot be relied on in reaching a decision unless the record is reopened. In considering these developments the Commission is aware that the institution of these proceedings stimulated great activity in the color field and that since fundamental research cannot be performed on schedule, it is possible that much of the fruit of this research is only now beginning to emerge. On the other hand, the Commission cannot overlook the obvious fact that one of the easiest methods of defeating an incompatible system is to keep on devising new compatible systems in the hope that each new one will mean a lengthy hearing so that eventually the mere passage of time overpowers the incompatible system by the sheer weight of receivers in the hands of the public.

149. The answer as to which course of action to choose depends on whether a method exists for preventing the aggravation of the compatibility situation if a final decision is postponed. If there is no method to accomplish this, the Commission believes that a final decision should not be delayed and that the CBS color system should now be adopted. This would be consonant with our action in launching black and white television in 1941. On the basis of this record, the CBS color system is at least as fully developed as was the black and white system in 1941. However, if there is a method whereby aggravation of the compatibility problem can be avoided, we would feel more confident in postponing a decision so that a definitive resolution could be had of the matters set forth in the preceding paragraphs.

150. The answer to this question rests with the radio manufacturing industry. Existing television receivers are built to operate on transmission standards that have a horizontal synchronizing rate of 15,750 and a vertical synchronizing rate of 60. As a practical matter, the oscillators on receivers that accomplish the synchronization are built so that this response is broader than the specific figures set forth above. For example, if the horizontal synchronizing rate were 15,000 or 16,000, the receiver could accommodate itself to the change; there are controls on the front or back of the receiver that can be adjusted to operate on any figure within the assumed bracket 15,000 to 16,000. The same is true for the vertical oscillator. It is obvious that if the bracket within which the receiver could operate were as high as 29,160 for the horizontal oscillator and 144 for the

[fol. 167] vertical oscillator,[32] it would be capable of receiving CBS color transmissions in black and white simply by the adjustment of controls already on the receiver. Moreover, such a receiver would be capable of handling the different synchronizing rates that might be later adopted by the Commission for modification of the existing black and white, or CBS field sequential color, or both, as a result of further tests with horizontal interlace and long persistence phosphors.

151. In order to accomplish this purpose, the Commission simultaneously with the release of this Report is issuing a Notice of Proposed Rule Making providing for bracket standards in the present monochrome system. These bracket standards provide for a television composite video signal of substantially the type and proportion now employed in monochrome, but with the number of lines variable from 15,000 to 32,000 per second, and number of fields ranging from 50 to 150 per second.[33] Receivers built to incorporate such bracket standards would be equipped with a manual or automatic switch to select instantaneously between two sets of standards falling within the above ranges, one of which will be the present monochrome standards, and the other the CBS proposed standards. The receiver would produce pictures of equivalent size, geometrical linearity and brightness on each of the two positions of the switch. Interested persons are given until September 29, 1950 to submit comments. In addition, manufacturers are requested to submit a statement as to whether if the bracket standards are adopted they would, commencing with the effective date of the order adopting the bracket standards as final—30 days after publication of the order in the Federal Register—build all their television receivers so as to be capable of operating within the above brackets. If, on the basis of the comments submitted, the Commission is able to adopt the bracket standards as final without a hearing and if the Commission receives assurances from a sufficient number of manufacturers to insure that such bracket

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[32] See Paragraph 42.

[33] The Notice provides that if the brackets are adopted, television broadcasters will continue, until further order of the Commission, to broadcast in accordance with present standards—15,750 lines per second and 60 fields per second.

standards will be incorporated in the great majority of television receivers, then we will be in a position to postpone a decision in this proceeding since we will have the time to explore more fully the matters set forth above, confident in the knowledge that adequate provision has been made to prevent aggravation of the compatibility question. If the bracket standards cannot be made final without a hearing or if assurances are not received from a sufficient number of manufacturers concerning their plans for incorporating bracket standards in their receivers, the Commission will not feel free to postpone a decision, for every day that passes would aggravate the compatibility problem. In that event, a final decision would be issued adopting the CBS color standards.

[fol. 168] 152. One of the proponents of a color system in these proceedings is a substantial manufacturer of television receivers. One of the companies which has informally advised the Commission that it has developed a new color system is also a substantial manufacturer of television receivers. Two other parties in this proceeding are in the same category. Finally, the Radio and Television Manufacturers Association, a party in these proceedings, is a trade association whose membership comprehends a very large part of the television manufacturing capacity in this country. Within this group lies the answer as to whether the status quo on compatibility will be maintained if the Commission postpones the issuance of a final decision at this time. The Commission proposes to afford this group an opportunity to indicate to the Commission this answer by means of the procedure set forth in the previous paragraph.

153. If, pursuant to the procedure set forth in Paragraph 151, bracket standards are adopted as final and a decision as to the color phase of these proceedings is postponed, the Commission will issue a second Notice of Proposed Rule Making proposing that color standards be adopted on the basis of the CBS field sequential system. The same bracket standards set forth for black and white television in the previous paragraph would also be proposed for color television. In addition, interested persons would be invited to conduct field tests with respect to horizontal interlace for use in both black and white and color television so that specific proposals based upon such field testing could be

presented to the Commission for its consideration. Also, provision would be made for any person to propose a color system different from the field sequential color system proposed in the Notice by complying with the procedure set forth in Paragraph 154.

154. A special procedure would be established with respect to submission of comments addressed to the second Notice. Any person desiring to submit comments in favor of or in opposition to the Notice, or who desired to submit proposed amendments could do so by January 5, 1951. Oppositions or replies could be filed by January 22, 1951. If any person desired to propose a color system different from the field sequential color system described in the Notice, he would be required to deliver representative receiver apparatus to the Commission's laboratory at Laurel, Maryland, by December 5, 1950, and by that same date he would be required to have a signal on the air in Washington, D. C., for the purpose of demonstrating his system. He would also be required to conduct a series of demonstrations during the period from December 5, 1950 to January 5, 1951 to which the Commission would be invited. No color system would be considered eligible for any consideration by the Commission unless all of the above requirements were strictly complied with and unless the tests conducted during the period from December 5, 1950 to January 5, 1951 showed to the Commission's satisfaction that, in its judgment, the system had a reasonable prospect of satisfying all of the criteria for a color television system set forth in Paragraph 122.

[fols. 169-170] 155. It is apparent that the procedure described in Paragraphs 151-154 could necessitate a reopening of the record. This would be done if CBS desired to demonstrate its system with a direct view tri-color tube or other technique of displaying large size direct view pictures. In that event the Commission would be prepared to give CBS every assistance possible in securing the use of tubes or other equipment. The Commission would not expect that at the demonstration CBS should show a commercial type of equipment or equipment that was fully developed. What would be expected would be a detailed description of the equipment, an opportunity for the Commission's laboratory to examine such equipment, and a demonstration that was sufficiently successful so as to form the basis for a reason-

able judgment that it would be possible to have color pictures of adequate color fidelity and resolution with no artificial limitation on the size of direct view tubes.

156. A hearing could also be required if an appropriate proposal were made concerning horizontal interlace or if a color system were proposed which fully meets the conditions set forth in the previous paragraphs. If the record is reopened for any one or more of the above purposes, the Commission's order will specifically prescribe the issues as to which further evidence will be taken and no evidence will be received concerning any other matter.

157. Simultaneously with the issuance of this Report, the Commission is also issuing a Notice of Proposed Rule Making providing for bracket standards in the present monochrome system and a notice setting the date of October 2, 1950 for commencement of hearing with respect to the general issues in these proceedings.

Federal Communications Commission. T. J. Slowie, Secretary.

Adopted: September 1, 1950.
Released: September 1, 1950.

* Commissioners Hyde and Hennock writing separate views and Commissioner Jones dissenting in part.

[fol. 171]

APPENDIX A

Witnesses in Color TV Hearing—Transcript References

Witness:	Presented by:	Transcript References Volume:	Pages:	
Baker, William R. G.	RMA	52	9600–9818	(cross-exam.)
		53	9820–9918	(cross-exam.)
Beville, Hugh M., Jr.	RCA	38	7465–7473	
		39	7481–7501	
		39	7525–7529	
		40	7670–7683	
		41	7716–7723	
Brown, George H.	RCA	5	2810–2868	
		6	2871–2962	
		39	7530–7543	
		40	7548–7670	
		40	7683–7714	
		41	7732–7828	
		45	8492–8553	(cross-exam.)
		56	10674–10760	(cross-exam.)
		59	11186–11195	(cross-exam.)
Chapin, Edward W.	FCC	26	5914–5922	
		45	8451–8491	
		56	10621–10673	(cross-exam.)
		62	11651–11658	(cross-exam.)
Christensen, John	CBS	62	11660–11686	
Coe, Conway P.	RCA	57	10980–11008	(cross-exam.)
		58	11017–11181	(cross-exam.)
Cosgrove, Raymond C.	RMA	2	2180–2315	
		45	8410–8445	(cross-exam.)
Cogan, David H.	CBS	11	3524–3527	
(Air King Products Co., Inc.)		48	9004–9077	(cross-exam.)
Cowan, Frank A.	A. T. & T.	36	6974–7101	
Cushway, C. P.	CBS	12	3679–3719	
(Webster Chicago Corp.)		48	9128–9145	(cross-exam.)
DeForest, Lee	American Television, Inc.	26	5886–5914	

[fol. 172]

DuBarry, Joseph N.	CBS	13	3791–3828	
(Smith, Kline & French)				
DuMont, Allen B.	DuMont	23	5550–5615	
		24	5617–5811	
		50	9373–9565	(cross-exam.)
Dunlap, Jack W.	CBS	32	6308–6390	
		33	6396–6451	
Easton, Allan	CBS	48	9116–9127	(cross-exam.)
Engstrom, Elmer W.	RCA	4	2648–2687	
		5	2689–2810	
		10	(demonstration).	
		31	6026–6181	
		41	7830–7930	
		43	8130–8165	
		45	8554–8601	(cross-exam.)
		57	10831–10978	(cross-exam.)
Fink, Donald G.	JTAC	1	2006–2177	
		31	6018–6020	
		42	7936–8124	(cross-exam.)
Fraser, Donald G.	CBS	33	6523–6530	
Geer, Charles Willard	Geer	13	3830–3943	
Goldin, H. H.	FCC	35	6790–6852	
Goldmark, Peter C.	CBS	7	3075–3253	
		11	3400–3508	
		11	3566–3586	

APPENDIX A—Continued

Witnesses in Color TV Hearing—Transcript References

Witness:	Presented by:	Transcript References Volume:	Pages:	
		14	3970–4026	
		33	6532–6575	
		34	6582–6671	
		47	8875–8980	(cross-exam.)
		49	9178–9304	(cross-exam.)
		57	10814–10830	(cross-exam.)
		59	11197–11284	(cross-exam.)
[fol. 173]				
Goldsmith, Jr., T. T.	RMA	4	2555–2644	
		25	5788–5811	
	DuMont	20	5073–5130	
		21	All	
		22	All	
		23	5528–5547	
		53	9920–10,032	(cross-exam.)
Greenwald, Myron J.	Celomat	36	6935–6972	
Gross, S. W.	CBS	11	3508–3523	
(Teleton Radio Corp.)		48	9099–9116	(cross-exam.)
Hamilton, H. G.	CBS	12	3664–3676	
(Eastern Air Devices, Inc.)				
Hogan, John V. L.	CBS	47	8867–8872	
Jensen, Axel G.	FCC	38	7354–7462	
Judd, Dean Brewster	CBS	12	3745–3789	
(Bureau of Standards)		49	9305–9320	(cross-exam.)
Katz, Oscar	CBS	35	6707–6789	
		49	9332–9337	(cross-exam.)
Kay, Leopold M.	CBS	11	3538–3565	
(Air King Products Co., Inc.)		48	9078–9098	(cross-exam.)
Kohner, Melvin	CBS	12	3719–3740	
(Webster Chicago Corp.)		48	9146–9167	(cross-exam.)
Lippincott, Donald K.	CTI	16	4455–4472	
		17	4476–4551	
		18	4556–4716	
		29	6001–6008	
		33	6452–6523	
		60	11390–11391	
		61	11402–11560	(cross-exam.)
		62	11563–11624	(cross-exam.)
Mathews, Arthur S.	CTI	60	11324–11386	
[fol. 174]				
McAndrew, William R.	RCA	41	7723–7732	
McConnell, Joseph H.	RCA	37	7226–7302	
McIntosh, Frank H.	CTI	18	4722–4725	
		19	4728–4817	
Mulhern, Edward F.	CBS	12	3588–3595	
(Birtman Electric Company)				
Murphy, Adrian	CBS	8	(Demonstration)	
		9	(Demonstration)	
		31	6186–6225	
		32	6227–6261	
		49	9337–9368	(cross-exam.)
		56	10765–10809	(cross-exam.)
Partridge, Charles W.	CTI	13	3945–3968	
Plummer, Curtis B.	FCC	35	6697–6706	
Riley, John W.	CBS	34	6671–6694	
		49	9320–9332	(cross-exam.)
Sanabria, Ulises A.	American Television Inc.	25	5743–5783	

APPENDIX A—Continued

Witnesses in Color TV Hearing—Transcript References

Witness:	Presented by:	Transcript References Volume:	Pages:	
Sarnoff, David	RCA	54	10035–10233	(cross-exam.)
		55	10235–10619	(cross-exam.)
Schubert, John S. (Birtman Electric Co.)	CBS	12	3623–3631	
		48	8995–9003	(cross-exam.)
Seiler, James	RCA	29	7502–7525	
Shapp, Milton J. (Jerrold Electronics Corp.) [fols. 175–176]	CBS	12	3632–3663	
Sleeper, George E.	CTI	14	4121–4124	
		15	4127–4293	
		16	4295–4154	
Smith, David B.	RMA	2	2316–2381	
		3	2384–2490	
		4	2495–2553	
	Philco	19	4819–4927	
		20	4929–5071	
		35	6853–6931	
		44	8168–8408	(cross-exam.)
Smith, Samuel Burrows	CTI	14	4029–4117	
		62	11624–11650	(cross-exam.)
Sparklin, Charles H. (Birtman Electric Co.)	CBS	12	3595–3622	
		48	8982–8995	(cross-exam.)
Stanton, Frank	CBS	6	2962–3073	
		37	7104–7220	
		46	8608–8773	(cross-exam.)
		47	8775–8863	(cross-exam.)
Sullinger, W. B.	W. U.	38	7306–7353	
Wilmotte, Raymond M.	Wilmotte	26	5813–5885	
Wright, Jay W.	CBS	32	6265–6306	
		48	9169–9176	(cross-exam.)

[fol. 177]

APPENDIX B

Description of Exhibits Introduced at Television Hearing in Docket Nos. 8736, 8975, 9175 and 8976

Exhibit Number	Description	Offered by
201	Notice of Further Proposed Rule-Making (FCC 49–948)	FCC
202	Amendments to above Notice: (FCC 49–1044) (FCC 49–1145) (FCC 49–1197) (FCC 49–1223)	FCC
203	"Comments on the Proposed Allocation of Television Broadcast Services." (Volume IV)	Joint Technical Advisory Committee (JTAC)
204	"Report of the Color Television Committee of the RMA Engineering Department."	Radio Manufacturers Association (RMA)
205	"Membership of Radio Manufacturers Association."	RMA
206	"Comments of Radio Corporation of America."	RCA
207	"Engineering Statement Supplemental to Comments of Radio Corporation of America."	RCA
208	Copy of letter dated September 13, 1949, addressed to Paul A. Walker, Acting Chairman, FCC by C. B. Jolliffe, replying to FCC letter of August 26, 1949.	RCA
209	Booklet consisting of 25 pages bearing the heading "A Six-Megacycle Compatible High-Definition Color Television System."	RCA
210[2]	Loose-leaf book containing tabs numbered 1–19, inclusive, entitled "Exhibits—Columbia Broadcasting System, Inc."	CBS
211	One page containing drawings illustrating use of "Color Cameras," "Color Receivers on Color Converters," and "Color Converter Only."	CBS

[fol. 178]

212	Chart bearing the title "Relative Registration Problems in Color Television."	CBS
213	Photograph of 2 pictures, illustrating "Low Contrast" and "Normal Contrast."	CBS
214[3]	Card containing 2 sets of pictures showing contrasts.	CBS
215	Graph showing "Amplitude Response—Vs—Freq. of Low Pass Amplifier."	CBS
216	Diagram of CBS disc-type receiver.	CBS
217	"Parts list for CBS Scanning Adapters and Color Converters."	CBS
218	"Schedule of Tests of CBS Color Television, October 6, 1949, Hotel Carlton, Washington, D. C."	CBS
219	"Local Video Facilities Provided by	CBS

[1] See Exhibit No. 287 and footnote 5.
[2] Item 20 added on October 24, 1949.
[3] Only one copy available for the record. No distribution.

APPENDIX B—Continued

Exhibit Number	Description	Offered by
	the Telephone Company in Connection with the CBS Demonstration . . ."	
220	"Camera Viewing Distances World Series Game, Thursday, October 6th, 1949."	Allen B. DuMont Laboratories, Inc. (DuMont)
221	"Physical Conditions of CBS Pickup at Woodrow Wilson High School, Washington, D. C., During Color Television Demonstration Before the FCC . . . October 7, 1949."	CBS
222	Schedule of Demonstration of RCA Color Television System—October 10, 1949 at Washington Hotel and Wardman Park Hotel in Washington, D. C.	RCA
[fol. 179]		
223	Chart showing transmission route from WNBW, Wardman Park Hotel to Hotel Washington.	RCA
224	Drawing showing distribution of primary colors by dichoric mirrors.	RCA
225	Forty-five (45) drawings for CBS color converter.	CBS
226	Copy of form of license agreement used by CBS in licensing manufacturers of color television receivers.	CBS
227	Copy of form of license agreement used by CBS in licensing manufacturers of color television transmitter studio apparatus.	CBS
228	Photograph of color converter.	CBS
229	Photograph of bolts and frame used with color converter.	CBS
230	Four-page pamphlet describing motors of Eastern Air Devices, Inc.	CBS
231	"The Geer Color Television Receiver Tube." (16 unnumbered pages).	Dr. Charles Willard Geer
232	One page containing four photographs showing "Front View of C.T.I." "Bakeout Ovens—Tube Laboratory," etc.	C.T.I.
233	One page containing three photographs showing "Racks of Equipment," etc.	CTI
234	One page containing four photographs showing "Tube Laboratory," "Studio," etc.	CTI
[fol. 180]		
235	One page containing three photographs of a color receiver showing "Back View," "Receiver Lens Unit," etc.	CTI
236	One page containing two photographs of a color camera showing "A Standard Monochrome Camera Converted for Color Pick-Up," and "Camera Lens Assembly"	CTI
237	One page containing three photographs showing "7 inch C.T.I. Trichrome Projection Picture Tube."	CTI
238 [4]	Gray-covered book entitled "Written Comments of Color Television Incorporated.".	CTI

[4] Contains affidavit of Arthur S. Mathews which was not offered as part of exhibit.

APPENDIX B—Continued

Exhibit Number	Description	Offered by
239	"CBS Color System Video Frequency Response Characteristics."	CBS
240	One page entitled "Scanning Sequence—Block Diagram."	CTI
241	One page diagram entitled "Color Transmitter."	CTI
242	One page diagram entitled "Color Receiver."	CTI
243	One page diagram entitled "Modified RMA Sync Pattern for Single Shift Color Scanning."	CTI
244	One page diagram entitled "Color Pulse Separator."	CTI
245	One page diagram entitled "Receiver Color Pulse Separator."	CTI
246	One page containing photographs entitled "Synchronising Waveform photographs (Unretouched)."	CTI
247	One page diagram entitled "CTI Color Television System."	CTI
[fol. 181]		
248	One page diagram entitled "Camera Scanning Generator."	CTI
249	One page diagram entitled "Color Slide Scanner."	CTI
250	One page diagram entitled "30 frame continuous film pickup on recorder."	CTI
251	One page diagram entitled "CTI Color Film Pickup System."	CTI
252	One page diagram entitled "CTI Color Television Receiver—Block Diagram."	CTI
253	One page diagram entitled "CTI Color Television Receiver—420 Volt Regulated Power Supply."	CTI
254	One page diagram entitled "CTI Color Television Receiver—Circuit Diagram R.F. High Voltage Power Supply."	CTI
255	One page diagram entitled "CTI Color Television Receiver—Video & Audio Circuits."	CTI
256	One page diagram entitled "CTI Color Television Receiver—Sync & Deflection Circuits."	CTI
257	One page diagram entitled "Lens & Tube Mounting Assembly."	CTI
258	One page diagram entitled "7" Tube Tri-lens Mounting."	CTI
259	One page drawing entitled "Table Model Color Receiver."	CTI
260	One page drawing entitled "Color Converter."	CTI
261	One page diagram entitled "CTI Direct View Color Receiver with Selective color line tube."	CTI
[fol. 182]		
262	One page diagram entitled "Color Shift Unit Block Diagram."	CTI
263	One page diagram entitled "Waveforms In Color Shift Unit For Field No. 1."	CTI

APPENDIX B—Continued

Exhibit Number	Description	Offered by
264	One page diagram entitled "CTI Color Shift Timing Unit."	CTI
265	One page diagram entitled "Transmitter Color Sync Injector—Block Diagram."	CTI
266	One page diagram entitled "Transmitter Color Sync Injector—Circuit Waveforms."	CTI
267	One mimeographed page entitled "Rules for Color Sequence Phase Shift."	CTI
268	Pamphlet of the Underwriters' Laboratories, Inc., entitled "Standard for Power-Operated Radio Receiving Appliances."	CBS
269	Forty-six (46) drawings for a combination black and white color receiver, table model.	CBS
270	One page drawing entitled "Color Television Systems."	CTI
271	One page chart entitled "Television Channels."	CTI
272	One page containing chart entitled "Video Waveforms for Vertical Lines."	CTI
273	One page containing chart entitled "Effect of distortion of color wave proposed by RCA."	CTI
274	Two pages entitled "Technical Qualications of David Beach Smith."	PHILCO
[fol. 183]		
275	Booklet consisting of 15 pages entitled "Statement on Behalf of Philco Corporation and Philco Television Broadcasting Corporation by David B. Smith."	PHILCO
276	Green folder entitled "Direct Testimony of Dr. T. T. Goldsmith," Volume IV, Section A.	DuMONT
277	Mimeographed booklet of 35 pages entitled "Comments in Opposition to Proposals filed with the F. C. C. August 26, 1949." Volume III.	DuMONT
278	Five pages entitled "Brief Report on the conversion to Color of an existing Hampshire Television Receiver."	DuMONT
279	Photographs of Hampshire Television Receiver with color converter in position.	DuMONT
280	Three mimeographed pages entitled "Reduction of Hum in DuMont Television Receiver for Purposes of Field Sequential Color Reception."	DuMONT
281	One mimeographed page entitled "Optical Performance of Demonstrated Receivers."	DuMONT
282	Five pages entitled "DuMont Price Estimates for Color Television Receivers."	DuMONT
283	Article in Saturday Evening Post entitled "Mr. Technicolor" by Frank J. Taylor. (10/22/49 issue.)	DuMONT
284	Copies of 3 identical letters sent by Wheeler & Wheeler to Counsel for RCA, CTI and CBS, dated 10/27/49.	RMA

APPENDIX B—Continued

Exhibit Number	Description	Offered by
285	One page containing letter dated November 2, 1949, to Edward K. Wheeler, Wheeler & Wheeler, from Richard S. Salant concerning Exhibits 216, 217, 225 and 269.	CBS
[fol. 184]		
286	Copy of letter dated November 2, 1949 from Glen McDaniel to Edward K. Wheeler replying to letter of October 27, 1949.	RCA
287 [5]	29 mimeographed pages entitled "Final Report of RMA Color Television Committee #4."	RMA
288	11 pages entitled "A Petition Regarding a System for Television at UHF."	Raymond M. Wilmotte
289	29 pages and 21 diagrams and charts entitled "Frequency Modulation."	Wilmotte
290	One page map entitled "Figure 1B, Polycasting, Example of Allocation for typical midwestern areas."	Wilmotte
291	One page map entitled "Figure 2B, Polycasting, Example of Allocation between New York and Baltimore."	Wilmotte
292	Article in November 1949 issue of "Tele-Tech" entitled "Dr. Lee de Forest's Color Television System."	Lee de Forest
293	10 mimeographed pages and 2 pages containing 11 figures, entitled "Reduction of Interference in TV Broadcasting by the Use of Frequency Modulation, Project No. 22531, Part I."	FCC
[fol. 185]		
294	Four mimeographed pages entitled "Notice of Program Material and Room Arrangements at Comparative Demonstration" (FCC 49–1524).	FCC
295 [6]	Description of facilities used during comparative demonstrations on November 21 and 22, 1949.	
296	Circuit diagram entitled "Automatic Scanning Adapter for Bendix Model 235 M1 TV Receiver" and parts list.	FCC
[fol. 186]		
297	Three mimeographed pages entitled "Color TV Comparative Demonstration—February 23, 1950.	FCC
298	One page diagram—"Receiver Set Up—CTI Demonstration—Hotel Statler—Washington, D. C.—February 20, 1950."	CTI
299	One page diagram—"Position of CTI Receivers—Laurel, Md. Laboratory."	CTI
299A	Statement of Donald K. Lippincott respecting transmitting and receiving equipment, receivers and receiver positions of CTI facilities at demonstrations of February 20 and 23, 1950."	CTI

[5] Substituted for report of RMA Committee #4 in RMA Exhibit No. 204.
[6] Exhibit number reserved during comparative demonstration on November 21, 1949.

APPENDIX B—Continued

Exhibit Number	Description	Offered by
300	Three mimeographed pages and 2 diagrams entitled "Transmitting and Receiving Facilities Used by Radio Corporation of America in the Comparative Tests, February 23, 1950."	RCA
301	"Description of CBS Transmitting and Receiving Facilities—Comparative Demonstration, February 23, 1950."	CBS
302	"Color TV Comparative Demonstration—FCC Laboratory, Laurel, Md., February 23, 1950—Observations of Picture Resolution."	FCC
303	Progress Report of December 30, 1949.	RCA
304	"Amendments to Written Comments, January 31, 1950."	RCA
305	Bulletin—"A 15 by 20-inch Projection Receiver for the RCA Color Television System."	RCA
306	Bulletin—"Synchronization for Color Dot Interlace in the RCA Color Television System."	RCA
307	Bulletin—"A Two-Color Direct-View Receiver for the RCA Color Television System."	RCA
308	Bulletin—"An Experimental UHF Television Tuner."	RCA
309	Bulletin—"A Three-Color Direct-View Receiver for the RCA Color Television System."	RCA
[fol. 187]		
310	Bulletin—"An Experimental Determination of the Sideband Distribution in the RCA Color Television System."	RCA
311	Bulletin—"A Study of Co-Channel and Adjacent Channel Interference of Television Signals, Part I."	RCA
312	Bulletin—"A Study of Co-Channel and Adjacent Channel Interference of Television Signals, Part II."	RCA
313	Bulletin—"An Experimental UHF Television Converter."	RCA
314	Bulletin—"Recent Developments in Color Synchronization in the RCA Color Television System."	RCA
315	Bulletin—"Colorimetric Analysis of RCA Color Television System."	RCA
316	Bulletin—"A Simplified Receiver for the RCA Color Television System."	RCA
317	"CBS Letter of December 20, 1949, to the Federal Communications Commission Outlining Proposed CBS Test Operations."	CBS
318	"Progress Report of Colombia Broadcasting System, Inc., Relating to Matters Covered by Commission Notice Issued November 22, 1949."	CBS
319	"Location of CBS Color Television Receivers November 22, 1949–February 23, 1950."	CBS
320	"Program Schedule—CBS Color Television Broadcasts—January 1 to February 1, 1950."	CBS

APPENDIX B—Continued

Exhibit Number	Description	Offered by
321	"CBS Color Television Camera Operation Log (Smith, Kline & French Equipment) for the Period December 29, 1949 to February 1, 1950, Inclusive."	CBS
322	"Basic Features of the CBS Color Television System."	CBS
323	Chart—"AMA Interim Meeting, December 6–9, Baltimore-Washington Pickup."	CBS
[fol. 188]		
324	Diagram—"Seating Arrangement, National Guard Armory—AMA Interim Meeting, December 6–9, 1949, Baltimore-Washington Pickup."	CBS
325	Chart—"Atlanta Graduate Medical Assembly—Atlanta, Georgia—February 6–8, 1950."	CBS
326	"Summary of Hours of Special Transmissions over Stations WCBS–TV, WOR–TV, WOIC and WCAU–TV Covering Periods During Which Color Was Transmitted (November 22, 1949 to February 21, 1950)."	CBS
327	Letter dated November 3, 1949, addressed to Commissioner Edward M. Webster by Richard S. Salant.	CBS
328	Correspondence between W. R. G. Baker, National Television System Committee and Adrian Murphy, CBS concerning CBS representation on NTSC.	CBS
329	"Color Television Interference Tests."	CBS
330	"Conditions at Pickup and Receiving Locations During Color Television Demonstrations for AMA Interim Convention, December 6–9, 1949."	CBS
331	"Qualifications and Experience of Dr. Jack W. Dunlap."	CBS
332	"Doctors' reactions to color television at the American Medical Association Interim Convention—Washington, D. C., December 6–9, 1949."	CBS
332[7]	12½-inch colored picture.	CBS
334[8]	16-inch black-and-white picture.	CBS
335	"Letter of January 30, 1950 from Dr. Peter C. Goldmark to Various Parties Re Automatic Adapter." (3 enclosures attached.)	CBS
336	"Combination Color—Monochrome Television Receiver—Instructions."	CBS
[fol. 189]		
337	"CBS Color Receiver Home Service Notes."	CBS
338	"Modifications to Standard TV Recording Equipment for Black and White Operation with CBS Color Standards."	CBS
339	"Summary of Changes to be Made to Single Camera RCA Field Equipment for Use on CBS Color Standards."	CBS

[7] Only one copy available for the record. No distribution.
[8] Only one copy available for the record. No distribution.

APPENDIX B—Continued

Exhibit Number	Description	Offered by
340	"Block diagram of single camera chain, using CBS and converted RCA field equipment, for CBS standards."	CBS
341	"Standards of Automatic Phasing Pulse with modification."	CBS
342 [9]	Two frames of technicolor film.	CBS
343	"Program. The Clincial Session of the American Medical Association Presents Color Television of Surgical Operations and Medical Clinics."	CBS
344	"Comparative Resolution of the Various Color Systems."	CBS
345–A [10]	Photograph, 525-line standard black and white resolution.	CBS
345–B [11]	Photograph, 4 megacycles, 405 lines, 144 fields, with crispening circuit.	CBS
[fol. 190]		
346	"A Study of Television Viewing Under Normal Home Conditions."	CBS
347	"Qualifications and Experience of Oscar Katz."	CBS
348	"Public Reaction to Color Television." January 12–February 1, 1950.)	CBS
349	"Public reaction to Color Television." (February 13–21, 1950.)	CBS
350	Letter dated February 6, 1950 to Dr. John Riley from Edward G. Reeve.	CBS
351	Minutes of meeting between FCC and CBS Representatives Concerning Field Tests.	FCC
352	Drawing of Converter bearing identification number B5770.	Celomat
353	Drawing of housing with built in magnifying lens bearing identification number C5774.	Celomat
354	"Bell System Intercity Television Facilities Existing and Planned as of March 15, 1950."	AT&T
355	"Television Broadcasting Stations in Cities Connected by Bell System Video Channel Networks As of March 18, 1950."	AT&T
356	"Television Broadcasting Stations in Cities connected by Bell System Video Channel Networks—Periods of Network Connection each day for week starting March 12, 1950."	AT&T
357	"Data Requested to be Furnished by Frank Stanton."	CBS
358	"Estimated Distribution of Cumulative Television Set Production, June, 1950–June, 1954."	CBS
359	(Reserved for cost data concerning color TV program. Testimony of William R. McAndrew was substituted for exhibit. Vol. 41, p. 7723–7732.)	RCA

[9] Only one copy of each frame available for the record. No distribution.
[10] Only one copy available for the record. No distribution.
[11] Only one copy available for the record. No distribution.

[fol. 191]

APPENDIX B—Continued

Exhibit Number	Description	Offered by
360	"Hours of Local and Network Programming of Stations Carrying NBC Programs—February 1–7, 1950—Interconnected Stations."	RCA
361	"Comparison of Network and Local Programming CBS Affiliates—February 1–7, 1950—Interconnected Affiliates."	CBS
362	"Statement By The Western Union Telegraph Co." containing four appendices.	WU
363	"Scanning Process in RCA Dot Sequential Color Television System."	Jensen
364	"American Research Bureau—Special Report For Station WNBW."	RCA
365	"Special Report For Station WNBW—February 11, 1950."	RCA
366	Letter dated March 14, 1950 from Kenneth M. Gapen to Charles Colledge.	RCA
367	"Analysis of Mail Responses to NBC Color Television Tests."	RCA
368	"Additional Data on Co-channel and Adjacent-channel Interference of Television Signals."	RCA
369	"Summary of Results of Co-channel and Adjacent-channel Television Signal Interference Studies."	RCA
370	"Frequency Characteristic of the Transmitter of Television Station WNBW, Washington, D. C."	RCA
371	"Additional Data on Signal to Interference Ratios."	RCA
372	"Additional Data on Signal to Ambient Noise Ratios."	RCA
[fol. 192]		
373	"Additional Data on Signal to Receiver Noise Ratios."	RCA
374	"Additional Data on Transmission Irregularities."	RCA
375	"Additional information on effect of color sync and phasing signal on black and white receivers."	RCA
376	"Additional information on UHF television transmitters and receivers."	RCA
377	"Summary of field test activities with relation to Appendix A of the Commission's Notice of November 22, 1949."	RCA
378	"Studio equipment and costs for RCA color television system."	RCA
378–A	"Supplement to Exhibit No. 378."	RCA
379	"An analysis of the sampling principles of the RCA color television system."	RCA
380	"Estimated population served by radio relay by end of summer 1950."	RCA
381	"Population within estimated service areas of cities which could receive 4 megacycle network service by radio relay as of March 22, 1950."	RCA
382	"General description of receivers for the RCA color television system which employs the RCA direct-view tricolor kinescopes."	RCA

APPENDIX B—Continued

Exhibit Number	Description	Offered by
383	"RCA tri-color kinescope demonstration arrangements in NBC Studio A, Translux Bldg., Washington, D. C., April 6, 1950."	RCA
384	"Responses of RMA members to inquiry whether they had ever made experimental color television receivers."	RMA
[fol. 193]		
385	"Post-war RMA set production by model."	RMA
386	"Radio & Television Retailing in two parts—Part two, March 1950."	RMA
387	"Description of techniques and equipment employed in Part B of the color TV comparative demonstration February 23, 1950, at F.C.C. Laboratory near Laurel, Maryland."	FCC
388	"Statement of E. W. Chapin, Chief, Laboratory Division, Federal Communications Commission."	FCC
389	"Project No. 222912—March 23, 1950—Part I—Beat pattern effects in the RCA color television system as compared to standard monochrome."	FCC
390	"Television modulation systems, Project No. 22531, Part III, modification of existing black and white receivers to receive color television."	FCC
391	"Project No. 222912—April 5, 1950—Part II—Beat pattern effects in the CBS color television system."	FCC
392	"Color characteristics of the RCA tri-color kinescopes."	RCA
393	"Location of present and projected television stations." (Map)	CBS
394	"A statement of some television facts."	CBS
395	Complaint and affidavit of J. H. Ream in action entitled "Supreme Court; New York County—Columbia Broadcasting System, Inc., Plaintiff, against Columbia of New York, Inc., Defendant.	CBS
396	"Cost information for converting the studio equipment of a monochrome station to color using CBS color standards."	CBS
[fol. 194]		
397	"B. & W. television receiver brightness survey."	CBS
398	"Fig. 1—Contrast discrimination versus brightness."	CBS
399	Gray covered book containing copies of letters sent by Webster—Chicago Corporation on November 21, 1949, to manufacturers of television receivers.	CBS
400 [12]	Six separate pictures of console television receivers.	RCA
401	Diagram—"Receiver for CBS color-TV horizontal interlace tests."	CBS
402	"Principal patented elements of CBS color television system as demonstrated to FCC and used during tests under FCC Notice of November 22, 1949."	CBS

[12] Only one set available for record. No distribution.

APPENDIX B—Continued

Exhibit Number	Description	Offered by
403	"Total licensing fees which may be payable by manufacturer of combination standard black and white and CBS color receiver, assuming licenses from RCA and Hazeltine."	CBS
404	"License Agreement between Allen B. DuMont Laboratories, Inc., and ——— For Cathode Ray Tubes."	Dumont
405	Gray covered book containing "Additional Color Television Exhibits."	Dumont
406	"Demonstration of CBS television for the Federal Communications Commission." (April 26, 1950—N. Y. City)	CBS
407	Three photographs of new CBS industrial color television camera and control unit.	CBS
408	"Time availability and cost of apparatus necessary for color television."	RMA
[fol. 195]		
409	"Brightness measurements on Commercial black-and-white television receivers."	Dumont
410	"License agreement between Radio Corporation of America and for commercial radio apparatus." (1947)	RCA
411	"License agreement between Radio Corporation of America and for radio broadcast receiving sets and electrical phonographs." (1948)	RCA
412	List—"Patents pertaining to television standards recommended by RMA owned by RCA and/or under which it has the right to grant, and has granted, licenses to others."	FCC
413	Letter dated September 10, 1938, from Bond Geddes to Chairman, FCC enclosing proposed TV standards T-101 to T-414.	FCC
414	List—"Video patents (excluding electron tubes) owned by Radio Corporation of American and being used by RCA or its licensees as of December 31, 1948, in the manufacture of TV transmitters pursuant to the Commission's monochrome transmission standards for TV broadcast stations."	FCC
415	Video patents owned by Radio Corporation of America and being used by RCA or its licensees as of December 31, 1948 in the manufacture of TV receivers capable of receiving transmissions of TV transmitters complying with the Commission's monochrome transmission standards for TV broadcast stations."	FCC
[fol. 196]		
416	List—"Video patents, excluding electron tubes, which RCA has the right to sublicense but does not own reported by RCA to be in use either by itself or licensees as of April 13, 1949, for the manufacture of TV transmitters pursuant to the Commission's monochrome transmission standards for TV broadcast stations."	FCC

APPENDIX B—Continued

Exhibit Number	Description	Offered by
417	List—"Video patents (excluding electron tubes which RCA has the right to sublicense but does not own reported by RCA to be in use either by itself or licensees as of April 13, 1949, for the manufacture of TV receivers capable of receiving transmissions from transmitters complying with the Commission's TV monochrome transmission standards."	FCC
418 [13]	"Commercial apparatus—license agreement between Farnsworth Television & Radio Corporation (licensor) and ——."	FCC
419 [14]	"Television receiving set—license agreement between Farnsworth Television & Radio Corporation and ——."	FCC
420	Two booklets—"Coronet presents How Much Bunk in Color Television? by John L. Springer" and "Is Color Television Ready for the Home?"	CBS.
421	"Kind of Equipments Owned by Television Stations in Markets that have One and Two Stations."	RCA
422	Copy of court decision "United States v. Radio Corporation of American et al., No. 793, District Court, D. Delaware, September 15, 1942."	Dumont
423	"Description of color television receivers used in laboratory tests."	RCA
[fol. 197]		
424	Graph—"Fig. 1, Ratio of interfering signals for equal objectionability."	RCA
425	Graph—"Fig. 2, Ratio of interfering signals for discernible interference."	RCA
426	Diagram—"Color adaptor for Model 9-403M."	CBS
427	"Total RCA color broadcasting time in Washington area."	RCA
428	"Operating instructions on RCA color receivers."	RCA
429	"RCA color television programs"—Channel 4, WNBW, Washington, D. C., during *week of May 1, 1950.*	RCA
430	"RCA color television programs"—Channel 4, WNBW, Washington, D. C., during *week of May 8, 1950.*	RCA
431	Letter dated February 24, 1944, to K. S. McHugh to Niles Trammell.	RCA
432	Letter dated February 29, 1944, from K. S. McHugh to Niles Trammell with attachment (map).	RCA
433	Letter dated April 17, 1945 from Niles Trammell to K. S. McHugh.	RCA
434	Letter dated April 20, 1945, from K. S. McHugh to Niles Trammell.	RCA
435	"RCA color receiver installations in Washington area."	RCA

[13] Copies supplied for record. No distribution.
[14] Copies supplied for record. No distribution.

APPENDIX B—Continued

Exhibit Number	Description	Offered by
436	List—"TV transmitter and receiver patents RCA has right to sublicense which were reported in use in 1949 by their respective owners."	FCC
[fol. 198]		
437	List—"Agreements by which RCA has obtained the right to sublicense FM and video patents owned by others and retain royalties."	FCC
438	List—"Video transmitter RCA licensees engaged in the manufacture of TV broadcast transmitters pursuant to Commission's monochrome transmission standards as of January 1, 1949."	FCC
439	List—"Video broadcast receiver manufacturers licensed by RCA and reported by RCA to have made sales of such receivers during February of 1949."	FCC
440	List—"As of December 31, 1948, RCA reported to FCC that it had pending infringement suits against video receiver manufacturers based on patents listed below."	FCC
441	"Service requests on RCA receivers installed in Washington area."	RCA
442	Mimeographed letter consisting of 10 sections designated 442–1 to 442–10, inclusive correcting and bringing up to date Exhibits 414–417 and 436–439; also list of manufacturers of TV receivers not licensed by RCA; list of patents asserted by RCA in pending litigation; and list of interferences with Farnsworth.	RCA
443	"Instances in which RCA has granted non-standard licenses."	RCA
444	"Supplemental exhibit on RCA service requests."	RCA
445	"Description of the CBS crispening circuit."	CBS
446	"Measurements of contrast range on monochrome TV receivers."	CBS
447	One page containing two graphs: "From Appendix of the Report of Panel #7 of the National Television System Committee November 19, 1940."	CBS
[fol. 199]		
448 [15]	Translation "Characteristics of the Image as the basis of Motion Pictures by R. Thun, D. K. G. of Schonelche."	CBS
449	"Time Required to Install RCA Color Receivers in Homes in Washington Area."	RCA
450	"Cathode Ray Tube Sales."	RMA

[15] One copy of original article supplied for the record.

APPENDIX B—Continued

Exhibit Number	Description	Offered by
451	"Schedule of subject matter to be shown in connection with demonstration of color television by Color Television Incorporated of San Francisco, held before the Federal Communications Commission at its hearing in the Hotel St. Francis, San Francisco, California, 17 May 1950."	CTI
452	"Pattern for Single Shift-Horizontal Shift."	CTI
453	"Pattern for Interlaced Shift."	CTI
454	"Data supplied by Color Television Incorporated (CTI) to show additional or modified components required for its line-sequential color television system."	CTI
455	"Floor Plant Arrangement for Color Television Incorporated Demonstration of 17 May 1950 at St. Francis Hotel, San Francisco, California."	CTI
456	Chart—"Television Synchronizing Waveform."	CTI
457	Diagram—"Interlaced Shift Generator."	
458	Diagram—"Horiz. Deflection and Sync Unit—Color Receiver."	CTI
459	"Field Tests Conducted by Color Television Incorporated—Description of Apparatus Used and Summary of Observations Made."	CTI
460	"Arrangement of Equipment at Color Television Incorporated, San Francisco, California for Co-Channel Interference Tests."	CTI
461 [16]	"Supplement to Alterations and Written Comments of Color Television, Incorporated, and Proposed Standards of Good Engineering Practice Concerning Television Broadcast Stations."	CTI
[fol. 200]		
462	Diagram—"Color Shift Circuits—Interlaced Shift Generator."	CTI
463	Diagram—"Color Drive & Tear Corrector—Interlaced Shift Generator."	CTI
464	Diagram—"Color Sync Mixer & Horiz. Drive Shift—Interlaced Shift Generator."	CTI
465	Fcc Laboratory Division—Project No. 222912—May 3, 1950—"Part III—Beat Pattern Effects on RCA Color Receiver Employing High-Level Sampling."	FCC

[16] Filed with the Commission on March 21, 1950. No distribution.

[fol. 201] SEPARATE VIEWS OF COMMISSIONER HYDE

I fully concur with the findings, with ¶120 to 143 inclusive of the conclusions of the majority, and with the proposal to adopt bracket standards. However, I am of the firm opinion that, based upon such findings, a final decision should be issued forthwith adopting standards for the CBS color system for the cogent reasons set forth in the mentioned conclusions with which I concur, and for the following additional reasons:

First—the fact that the operation of the CBS field sequential system with a direct view tri-color tube has not been demonstrated to the Commission, does not, in my opinion, preclude a final decision at this time. I am confident that acceptable tri-color tubes will be developed in the not too distant future and that the skill and ingenuity of the electronics industry will resolve the technical difficulties still to be overcome. Further, and in accord with the views of the majority, I believe that the normal competitive forces which would be released by the final adoption of a system at this time, would hasten the development of tri-color tubes. Moreover, the unanimous opinion of the expert witnesses representing both proponents and opponents of the CBS system, who testified on this point, was to the effect that such tri-color tubes would be usable by a field sequential system. This minimizes the "speculation and hope" referred to by the majority and makes the usability of such an ultimately developed tube by a field sequential system a virtual certainty. In addition, during the interim period required to develop an acceptable tri-color tube, color television would be available to those desiring it, through the use of disc or projection equipment.

Second—I am of the opinion that such dislocation and inconvenience as will necessarily be caused by the introduction of a color system, would be minimized by definitive action now. Such dislocation and inconvenience would be magnified by the absence of final action during the period of indecision, the length of which cannot be precisely determined at this time. Purchasers of new sets who would have had the option of obtaining color-sets immediately, if they so desired, will now be forced to elect either to purchase a set which will require conversion to color, or to await final action at some future undeterminable date. Manufacturers would have been able to devote their full television research

facilities and energies towards the further improvement of one proved and accepted system meeting all of the criteria set forth in ¶122 of the conclusions, instead of dissipating them in further attempts to surmount difficulties which may be inherent in non-field sequential systems, such as those shown to exist in the systems demonstrated in this proceeding. Broadcasters would have been able to begin immediate experimentation with color programming techniques, assured of a progressively growing audience during the period of transition.

[fol. 202] Third—although I agree with the majority that the adoption of bracket standards will minimize further aggravation of the existing problem of compatibility, the majority discards too lightly the fact that the important problem of convertibility to color will be progressively worsened by each day of delay, and with each set manufactured.

Fourth—I am in full agreement with the majority's fear, as expressed in ¶148 of the conclusions, that "one of the easiest methods of defeating an incompatible system is to keep on devising new compatible systems in the hope that each new one will mean a lengthy hearing so that eventually the mere passage of time overpowers the incompatible system by the sheer weight of receivers in the hands of the public". The past history of these proceedings clearly shows that the danger feared by the majority of the possibility of unwarranted and costly delays hindering the introduction of color television is all too real. I am, therefore, of the opinion that the surest method to obviate the risk of unnecessarily delaying color would be to make a final determination at this time.

However, despite our differences as to methods to be used to achieve our aim, I am confident that all the Commissioners and the responsible members of the industry are as eager as I to terminate these proceedings with the adoption of a system meeting all of the mentioned criteria set forth in ¶122 of the conclusions, and to expedite the use and enjoyment of color television. Accordingly, I hope that the fears expressed by the majority and by me will not be realized, and that industry will cooperate with the Commission in reaching the goal by not requesting unnecessary or unwarranted delays. Such delaying tactics would receive the short shrift they merit at the hands of the full Commission, in accord with avowed views of the majority

as specifically set forth in ¶154 to 156 of the conclusions. Although, as I have heretofore stated, I am in favor of a final decision now, the Commission by majority vote has selected a different procedure for the termination of these proceedings. Accordingly, I concur especially with those conclusions which place stringent limitations on the reopening of the record and which restrict the issues and scope of the further proceedings in the event the record is reopened.

[fol. 203] SEPARATE VIEWS OF COMMISSIONER HENNOCK

I agree with the majority of the Commission that more time is desirable before making a final decision of the very difficult question confronting us in this proceeding. I also feel that in order to gain that time it is imperative that the problem posed by the great number of black and white receivers in the hands of the public which are unable to receive transmissions under the standards proposed for the most promising of the color systems we have considered, be contained at its present level. I therefore concur fully in the decision to issue a Notice of Proposed Rule Making concerning bracket standards. In the event that we do not receive sufficient assurance that this protection for future investors in television receivers will be built into sets hereafter produced, I would adopt field sequential color standards.

However, I cannot agree that in the event that bracket standards are adopted a tentative determination to adopt an incompatible color system should be made. Such a decision would, I believe, be premature. I agree with the majority that neither of the compatible systems considered in this proceeding could be authorized at the present time. Still, the improvement which took place during the course of the hearings, a relatively short time when compared to the previous course of television development, was impressive. There are many indications that intense effort is being exerted to overcome the difficulties inherent in compatible color systems. Off-the-record developments by Hazeltine, General Electric, Color Television, Inc., and R. C. A. may be bringing us a little closer, if not near, to the realization of a practical compatible color system. In any event we should work toward that end with all our energy until the last possible moment, and not foreclose the possibility of its achievement until convinced that it is a practical impossibility.

I realize that the concept of compatibility as used in this Report is not identical with that set forth in the Notice of Further Proposed Rule Making issued in this proceeding on July 11, 1949. It has, however, in my opinion become evident since that time that the effect on our present VHF television service caused by the adoption of any system which is not compatible as defined in this Report would be very serious. The problems which it would pose for the present set owner and the broadcaster should loom large in our thinking, and we should do our best to avoid them if possible.

The most direct effect of the adoption of incompatible color standards on the present set owner would be an immediate or eventual diminution of television service, or alternatively, the necessity of making an additional expenditure to maintain the usefulness of his set. To the extent that the proposed field sequential standards are utilized the present set owner would be unable to make use of his receiver. Although color broadcasts may be restricted to "fringe" time in the beginning, there must eventually come a time when there are sufficient new or adapted sets in the hands of the public that color would be broadcast during the more choice hours. At that point the present [fol. 204] set owner would be forced either to buy a new set,[1] adapt his present set if that is practicable, or give up virtually all television service. I feel that there is a moral obligation on this Commission to insure that valuable programming service will continue to be rendered to present set owners, both day and night, for a reasonable period, e.g., three to five years, without the necessity for making any expenditure to change their sets.

Although the record in this preceeding indicates that many sets may be adapted for $32 to $50, it is also clear

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[1] I include the possibility of converting present sets for the reception of color broadcasts in color with this alternative. The change required would be quite extensive, and there is considerable question in my mind whether this course would prove popular even with the owners of sets which could be so converted. This would be true of the compatible systems as well, but in their case only those who felt that color was worth the additional expense would have to change their receivers.

that other sets might require more expensive changes to be enabled to receive field sequential color broadcasts even in black and white. The problems posed by the necessary servicing of such installations have not been fully explored —many sets may have to be returned to the factory, sufficient properly trained service personnel may not be available, and the cost of labor for even a home installation may greatly increase the difficulty of adaptation. And it must be remembered that with all this the set owner may have an additional gadget to place on his receiver, the receiver will probably be more complicated to operate, and the geometric resolution of the picture he receives will be reduced without the compensating advantage of color. The magnitude of these problems is tremendous when it is realized that estimates indicate that almost 7 million sets were in use on August 1, 1950, and that there will be 10 million in the hands of the public by the end of the year.

Incompatibility will also pose a serious problem for the broadcaster, and its effects will very likely be felt by all television viewers. To the extent that there are receivers in the hands of the public which are unable to receive field sequential color broadcasts, every program broadcast under those standards entails a loss of audience for the broadcaster. Our broadcasting system is dependent for its economic existence upon advertising revenue, and the advertising value of a broadcast varies directly with the number of people which it can reach. The decision to produce a program in color will be a difficult one for the broadcaster to make if it means that the program will thereby become less saleable. The transition to color must, when viewed in this light, be long and difficult. With compatibility any program could be produced in color without loss of audience, and a great impetus would be provided for the purchase of new color receivers.

Color television is, I feel, a great forward step, with untold potentialities for the improvement of television for education and industry as well as entertainment. But is has been decided by this Commission that the most desirable [fols. 205-206] course to follow would be to allow more time for the development of all color systems, including the CBS field sequential system. In view of this fact, and the fact that the problems posed by incompatibility will be frozen at their present level, I feel that every encouragement should be given the development of a compatible color system. It

would be improvident, in my view, to allow only as little as three months for such a significant and difficult development to take place. I therefore feel that the date of final decision in this matter should be postponed until June 30, 1951. I do agree with my colleagues in their evaluation of the present state of the relative development of the various proposed systems so that if by that time no significant change has occurred, I would vote for the adoption of the field sequential system.

[fol. 207] SEPARATE OPINION OF COMMISSIONER JONES DISSENTING IN PART

I certainly join in all the findings and the conclusions up to and including paragraph 143, unanimously adopted by the Commission. These findings and conclusions establish that CBS is the superior color system and the only system ready for adoption. The reasons for my dissent from the majority's action are:

1. I dissent because there is a fundamental disagreement between the majority and myself. Stated as succinctly as possible, that fundamental disagreement between us is that I am for color *now*. Whatever the protestations or words of the majority, their action on this day is most certainly *against* color now.

2. Two systems, RCA's and CTI's, claimed at the beginning of the hearing to be fully compatible and to render a high standard of performance. They failed on both accounts throughout 9700 pages of record and in the individual and comparative demonstrations held over an eleven-month period.

3. The third system, CBS's, fully complied with the Commission's Public Notice of May 1949 and its formal proposal of July 1949 commencing these proceedings. CBS successfully demonstrated on the same record and in the individual and comparative demonstrations during the same period that it was adaptable—that satisfactory black and white pictures could be received from CBS color signals with minor modifications on existing sets at relatively minor cost.

4. The Commission unanimously finds that CBS field sequential color is superior to RCA dot sequential color and CTI line sequential color.

5. As a system, CBS now fully complies with the

criteria unanimously adopted by all seven Commissioners and described in paragraph 122.

6. The Commission unanimously has said about CBS color, and I heartily agree, that it produces a color picture that is most satisfactory from the point of view of "texture", "color fidelity" and "contrast". Receivers and station equipment are simple and easy to operate. It has found that the CBS picture "is bright enough and has sufficient contrast range to be entirely adequate for use in the home under normal viewing conditions". It has concluded that despite the fact the CBS system has less geometric resolution than standard monochrome, "the addition of color more than outweighs the loss in geometric resolution so far as ap- [fol. 208] parent definition is concerned". It has found that compared to present commercial black and white television, interference factors are substantially the same. As a matter of fact, the Commission expressly states: "On the basis of this record, the CBS color system is at least as fully developed as was the black and white system in 1941"—when standards were set for commercial black and white set operation. The obvious question naturally poses itself: Why, if these things are true, do the majority not adopt final standards for field sequential color? In assigning "reasons" for not adopting final standards for field sequential color, the majority has invented new hurdles for color to jump when the old hurdles have been overcome.

7. The majority promises that these hurdles will be cancelled in thirty days if the industry does not build bracket standards into a substantial number of black and white television receivers produced hereafter. Thus the majority abandons its power to now decide the color question on the merits—after it has found that field sequential color is superior and is ready now. It lets the television industry decide whether we will have field sequential color thirty days from now or whether we will wait until January 1951, or perhaps throw the system out completely.

8. The Commission says "if a satisfactory compatible system were available, it would certainly be desirable to adopt such a system"; that based upon a study of the history of color development over the past ten years, "from a technical point of view compati-

bility . . . is too high a price to put on color". Nevertheless, it abandons its opportunity to finalize on the successful incompatible system in favor of a possible decision by any one in the television industry to try any other color system.

9. In view of the consistent record of the industry thwarting color for ten years,[1] the Commission gambles with the only proponent who has advanced a successful system of color television these ten long years. Although the majority claims that the status quo will be maintained by a promise of the industry to build bracket standards into a substantial number of new black and white receivers, color still is not being fostered commercially and only black and white is being fostered. The majority says "one of the easiest methods of defeating an incompatible system is to keep on devising new compatible systems in the hope that each new one will mean a lengthy hearing so the- eventually the mere pas age of time overpowers the incom- [fol. 209] patibl systems". In its attempt to relieve the compatibility problem, during the period of more delay, the majority overlooks the fact that because the percentage of sets capable of receiving CBS color signals in black and white goes up, color is not promoted one iota.

10. The majority decides: A demonstration of the direct-view tri-color tube with the CBS system is *unnecessary* if a substantial percentage of black and white receivers hereafter produced do not contain bracket standards. If such sets do contain bracket standards, the majority avoids finalization because it wants such a tube demonstrated.

11. The majority decides more information on horizontal interlace is unnecessary if a substantial percentage of black and white receivers hereafter produced do not contain bracket standards. If they do, the majority again avoids finalization because, it says, it wants to know more about horizontal interlace. But it has found that the apparent definition of CBS color pictures is already satisfactory without horizontal interlace. So why wait?

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[1] See the Annex to this opinion.

12. The majority decides that it need not further consider the development of long persistence phosphors if a substantial percentage of black and white receivers hereafter produced do not contain bracket standards. If they do, the majority again avoids finalization because it wants to know more about long persistence phosphors. The Commission, however, as a part of this decision would force the industry to adopt bracket standards in black and white receivers without requiring any further proof or field testing of long persistence phosphors. Why, therefore, shouldn't we treat color in the same way?

13. We either need more information concerning direct-view tri-phosphor color tubes, long persistence phosphors and horizontal interlace, or we do not, irrespective of what the industry position is. Since the Commission will finalize CBS color if the majority of the manufacturers refuse to build bracket standards in a substantial majority of black and white sets hereafter produced, then it necessarily follows that the findings of fact amply support such action right now.

14. I agree with the majority that we ought to propose the adoption of bracket standards. I do not, however, believe that consideration of these standards should be permitted to delay a final color decision.

[fol. 210] 15. Had the Government thrown its weight against the public's desire to buy and play with crystal sets, against receivers with morning glory loud speakers and howling signals, on the theory that radio should not be commercialized until super-heterodyne and FM were invented, the tycoons of television would be dwarfs today and the radio industry would be but a feeble voice in America. Today we have a color system that has long since passed the howling speaker and crystal set stage. All of the Commissioners have agreed that the field sequential system is as good as black and white was in 1941 when commercial standards were set. Every proceeding must come to an end sometime. The Commission has tested the opinions of the whole industry in the crucible of exhaustive public hearings. It has determined those positions that have been unsound, lacking in imagination, and based upon fear of competition of color with black and

white television. The impurities of engineering and economic thought have been burned out by the findings and conclusions to which I adhere. The industry should examine carefully the refined ore so that it may align itself with the public interest. The Commission, on the other hand, should by final decision now cut the Gordian knot which has bound color television for ten years.

[fol. 211] ANNEX

I

The following is a study of the disgraceful treatment of the field sequential system by the industry from 1940 to date.

In all the history of the Commission, never have such exhaustive and comprehensive hearings been held in all facets of a service about to be launched. The sequential and simultaneous color systems have been discussed in industry committees since 1940.[1] The field sequential color system had been explored in 300 hours of actual broadcasts on the air in a 6 mc VHF band by early 1942. By December 11, 1946, 16 mc color television had been field tested for a period of 2½ years (Docket 7896, p. 373) cumulating over 2000 hours of filed sequential color broadcasting on the air The simultaneous color system never has had successful on-the-air broadcasts, as will be more fully discussed hereinafter. However, on the 18th day of March, 1947, field sequential color was rejected on several specific grounds. These specific grounds inferentially disclose that the Commission accepted the almost universal industry testimony

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[1] "In 1940 there was submitted to Panel No. 1 of the National Television Systems Committee the following description of a system requiring simultaneous standards:

> "'Three-channel, three-color additive system consisting essentially of an independent chain of equipment (RMA standards) for each of the three colors, including a separate kinescope of proper screen color for each, with optical combination of the three images . . . partially complete system tested in laboratory, and demonstrated to FCC, February, 1940.'" (Murphy, Docket 7896, pp. 64-65)

that the simultaneous system was the only system that should be considered by the Commission as worthy for commercial color broadcasting. Today, we know that the simultaneous system never had a successful on-the-air broadcast, as will be more fully discussed hereinafter. The vain hope for a color system better than field sequential color may explain why some of the grounds were unsound from an engineering standpoint. The unsoundness of some of these grounds denying color in 1947 has been proven in this 1949-50 hearing record. Other grounds show the 1947 Commission lacked imagination to encourage this new use of the radio art. It is my understanding that certain Commissioners were sympathetic, but their sentiments do not appear in the final decision. In any event, the sound nature of the field sequential color system and its great potentialities for engineering improvement were certainly not appreciated by either the industry or a majority of the Commission in 1947.

[fol. 212] For the purpose of appraising the Commission's 1947 decision and its lack of imagination, and the unsound engineering principles upon which that decision was based, it is necessary to discuss the background in which the decision was written. By background I mean the bases upon which engineering judgments have been made by industry witnesses in their testimony before the Commission. That involves the good faith if not truth and veracity of the witnesses for the industry, and the industry committees—especially the NTSC and the RMA. The beginning of the history is in 1940. In the first place, the FCC wanted color to be introduced at the same time that black and white television was considered. The Chairman of the FCC urged the industry to formulate standards for color as well as black and white. In addressing the first meeting of the National Television System Committee on July 31, 1940, Chairman Fly said to the industry:

> "If you want to say that color must come together with television and move forward and give us a complete television system at the outset, anyone would hope that such result could be made." (Proceedings of NTSC, Docket 5806)

In the face of these strong representations by the Chairman of the Commission, the NTSC was organized and Dr.

Baker was made chairman. The Committee organized itself into nine panels; Panel 1 was charged with reporting television systems to the main Committee. Field sequential color was demonstrated at that time in the laboratory as a possible system to be adopted at that time. Dr. Baker made a special trip to a meeting of Panel 1 to discuss color television with the panel. Deleted portions of the official minutes of Panel 1 show Dr. Baker's, and the industry's, attitude toward the introduction of color at the same time as black and white. Following are some of the significant statements of Dr. Baker that were deleted:

> "But I don't see from the viewpoint of the GE Company how we can afford to complicate the black and white system by introducing on top of that, color." (Tr., p. 9741)
>
> "If this thing [color] came to NTSC I would strongly oppose color for the reason that it is not old enough . . ." (Tr. p. 9745)
>
> "Frankly, if it came up to the NTSC, I would oppose it due to my ignorance of it." (Tr. p. 9746)
>
> "You know the NTSC does not presume to even make a decision except based on the evidence you submit, that is, which the panels submit. They are expecting you will turn down color television." (Tr. p. 9747)

Clearly, then, as far back as 1940, Dr. W. R. G. Baker, Chairman of the NTSC, had already made clear to the [fol. 213] NTSC that the industry did not want color and black and white television to be introduced at the same time.

In view of the official interest of the FCC in color, as expressed by the Chairman, it is significant that these portions of the minutes of the NTSC were deleted. It is regretted that the economic sentiments of the guiding engineering genius of Dr. Baker were not conveyed to the FCC at the time. For it is apparent that the Commission, at the hearings preceding the organization of NTSC, had been particularly anxious that no standards be set which would freeze the art to the RMA conception of black and white television. It had held extensive hearings on whether black and white should have 441 lines and 30 frames, as recommended by the RMA, or whether they should allow a flexible number of lines and frames, from 400 to 800 lines and from 30 to 15 frames. It is reasonable to assume that

if the Commission had held extensive hearings for the specific purpose of making sure that it was not freezing black and white television to the RMA concept in the industry's private interest, it certainly would not have permitted NTSC likewise to exclude the art of color television for those same purposes of private interest. This is demonstrated by the following questions asked by Chairman Fly and Commissioner Walker in trying to insure that the industry was not delaying color television:

"Chairman Fly: Doctor, this is the only committee that deals with color television?

"Dr. Goldmark: Well, some of the other panels have also color television but in a very general sense. We were charge with making a more thorough investigation. I think the other panels, as you will probably hear later, made statements as to the broad policy.

"Chairman Fly: I am wondering about the future technical advance of color television and to what degree there is cooperation in the industry in moving color television forward. Are you making your information and your resources in general available to engineers of the other companies?

"Dr. Goldmark: Upon request, yes.

"Chairman Fly: And, are any of the other companies undertaking to move any phases of it forward?

"Dr. Goldmark: There are two or three companies which definitely are interested and took steps to obtain information from us regarding color; in addition we gave papers on every phase of color television to the whole industry keeping back nothing.

"Chairman Fly: And as I understand, you and the Columbia Broadcasting System will cooperate with any of the companies that wants to undertake to—beginning [fol. 214] at this point—further develop color television so as to move toward bringing it into the scope of practical operation?

"Dr. Goldmark: Absolutely.

"Commissioner Walker: It isn't tied up with patents?

"Dr. Goldmark: Not on our part. We have patent applications but that is no concern of ours. The primary purpose, in other words, is to get cooperation and our primary interest is color television per se, whether it is ours or somebody else's it makes no difference.

"Commissioner Walker: You are not trying to restrict it by patents?

"Dr. Goldmark: Oh, no." (Docket 7896, pp. 2311-13)

These events all occurred in the following background: The membership of the NTSC had viewed laboratory demonstrations of the field sequential color system and had overwhelmingly approved of the color pictures produced by CBS. These votes were duly recorded in their minutes. Specifically, by a vote of 30 to 4 they preferred color television as demonstrated by CBS[2] to black and white. By a vote of 34 to 2 they said the addition of color increased the entertainment value of televised pictures. By a vote of 32 to 3 they thought the color quality of such color pictures would be acceptable to the public. By a vote of 31 to 7 they thought color adds to the apparent resolution of a black and white picture. By a vote of 20 to 12 they thought the apparent resolution of color as demonstrated was satisfactory. By a vote of 33 to 4 they thought that the brightness of the color picture demonstrated was acceptable. By a vote of 34 to 3 they did not believe that all commercial receivers should be able to receive color television as well as black and white. By a vote of 20 to 16 they did not believe that commercial black and white television receivers should be able to receive color transmissions in black and white. By a vote of 24 to 11 they decided that color transmissions should be allowed in Group A channels.[3] See proceedings of Panel 1, NTSC, Docket 5806.

One can readily conclude: Every reaction to color performance in 1940 to 1941 by this collection of eminent engineers was positive; but the test votes on establishing color [fol. 215] were negative. Panels 1, 6, 7 and 8 voted 25 to 16 that transmission standards for color television should not then be *considered*. This latter vote was apparently not based upon constructive engineering grounds, for many of the engineering problems that had confronted the adoption of black and white television were common to color. Settling these for black and white television, they would

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[2] It will be noted that the system they were judging was a 6 megacycle field sequential system.

[3] Group A channels consisted of seven channels between 50 to 108 mc.

have settled them for color. I refer to such problems as the modulation of the picture carrier, the modulation of the voice carrier, the distance between the voice and sound carriers in a 6 mc channel. The propagation characteristics of color as a separate problem from black and white was not raised. Likewise, neither were separate problems raised for color regarding co-channel and adjacent channel signal interference ratios. The unexpurgated record of the proceedings of the MTSC, disclosed formally in this hearing for the first time, after nearly ten years, demonstrates that recommendations of color standards for immediate adoption were deferred in accordance with Dr. Baker's instructions to Panel 1, NTSC, quoted above.

It may be said without contradiction that considerations for delay of color were based upon alleged ignorance of the industry and purely economic considerations concerning the impact of beautiful color television pictures upon black and white television pictures. More specifically, the manufacturers' considerations were: the effect of the sale of color receivers upon the sale of black and white receivers.

Convincing evidence that Dr. Baker's colloquy with Panel 1 of NTSC in September, 1940, expunged from NTSC official records, had great weight upon the manufacturing industry's engineering talent is buttressed by the television industry scientists' testimony in the 1946-47 color proceedings.

Some of the manufacturing industry back in 1940 supported color; later they joined the black and white bandwagon. Du Mont is an example of this.

Du Mont in 1940 had recommended 800 lines and 15 frames for black and white television standards. Nearly the entire industry through RMA recommended 441 lines and 30 frames. Du Mont had fought the entire industry with the proposition that its 800[1] line standards and the RMA's 441 lines standard could be adopted by utilizing circuits in receiver design which would operate on any number of lines and frames between the two proposals. It used the different number of lines and frames conceived

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[1] Du Mont originally proposed 625 line standards on the basis of higher definition black and white pictures. It hoped to have flexible standards adopted which would provide 800 lines in the future.

then for field sequential color as an argument in support of its flexible standards. For, as Du Mont engineers argued, as higher definition in black and white television could be had with 800 lines so color could be introduced at any time because the flexible receivers would respond to the different number of lines and frames of field sequential color. Since the NTSC decided against proposing color standards in [fol. 216] 1941 and rejected Du Mont's 800 line-15 frame suggested standards for black and white television, Du Mont from that time on took the industry position that color was never ready for commercialization.

Proof that Du Mont was attributing an alleged engineering reason merely to support the manufacturing industry's economic position on color as expressed by Dr. Baker in 1940 may be seen as the Du Mont testimony in Commission proceedings unfolds. In the 1947 color hearings Dr. Du Mont said:

> "PROPAGATION. At the present time the frequencies between 480 and 920 megacycles have been assigned for experimental television use and it is proposed to use this band for color television.
>
> "Several years ago at the hearing on the allocation of frequencies fears were expressed by a number of the parties involved that, while this band was satisfactory for relay purposes where sites could be selected, it would not be suitable for broadcasting where the receiving location could not be chosen. Our experience since that time, while not as extensive as we would like, leads us to believe that these frequencies are not suitable for broadcasting use except in certain instances involving fortunate geographical locations. The details of the tests we have made in this connection will be discussed by T. T. Goldsmith, Jr." (Docket 7896, pp. 1406-7)

But by 1948 Du Mont was confident that the UHF could be used for black and white:

> "The Chairman: Mr. Goldsmith, you are advocating that we now have enough information to go ahead and allocate this band for black and white?
>
> "The Witness: Yes.
>
> "The Chairman: 475 to 890?
>
> "The Witness: Yes." (Tr. 168)

Du Mont engineers did not claim they had made further propagation tests in the UHF, nor that they had developed equipments, particularly tubes, to more effectively utilize the UHF. In fact, T. T. Goldsmith for Du Mont now recommended the use of UHF solely and specifically to prevent chaos which might result from channel loading black and white television in the VHF. He offered *no engineering* testimony in his support when the Chairman reminded him that JTAC and RMA still claimed they didn't have enough information for its utilization.

> "The Chairman: Your recommendations imply that you think we have sufficient information. The J.T.A.C. says we haven't, that we need more information on points A, B, C, D, E, and F.
>
> [fol. 217] "The Witness: Mr. Chairman, I feel that it would be highly desirable to get a lot more information on this subject, but, on the other hand, it is a matter of considering the lesser of the two evils, as I look at it. We have been establishing a nationwide television service, already going, at the rate of millions of dollars worth of business, with the public making tremendous investments. The allocation plan is spread thickly as now proposed in the VHF and will result in an awful lot of chaos. You can't hold those other people back for a few years and say 'We will see what we can do about it, we will build fences around the cities, and so forth.' There doesn't seem to be a real answer to it, to the scarcity, other than getting additional channels.
>
> "The second question is, where can you get those? We have studied very thoroughly the possibility of getting sufficient channels down low and it doesn't seem feasible at all to get enough to give a real competitive service and to satisfy the demand of those people willing to invest their money. We look to the regions of the F.C.C. set aside for future television. We say, is it useful? What about it? Well, there are lots of questions in that region. We don't know the exact answers. My feeling is that we can give enough safety margin on those factors which are still rather uncertain." (Tr. 168-9)

To complete the record that the Du Mont company wanted to utilize the UHF exclusively for black and white television, T. T. Goldsmith urged now that color television be committed to the uncharted[5] microwave band of frequencies. There were no proponents of color in the September 1948 hearings, although CBS disclosed their 6 megacycle sequential color system to JTAC (Exhibit 1), but the Du Mont company was apparently making a record for further postponement if color television should rear its ugly head again. Dr. Goldsmith testified further:

> "Commissioner Walker: When you say 'open it up to immediate commercial use', you mean the monochrome system that you are using now?
>
> "The Witness: That is right, Commissioner Walker.
>
> "Commissioner Walker: Were you one of the parties that advised us to reserve these ultra high frequencies for color television?
>
> [fol. 218] "The Witness: Yes. I think it was a wise plan to reserve them for experimentation for all kinds of television systems. I would like to have it for color if we could do it, but I do not believe it is the wise thing to kill the black-and-white possibilities.
>
> "Commissioner Walker: What becomes of television after you have used all of these up for black and white?
>
> "The Witness: The color system, if developed, might ultimately replace the black and white in this same frequency range if it can be proven to be far superior, but I believe the color system if developed can probably use some microwave frequencies for its broadcasting." (Tr. 190-191)

Later Dr. Goldsmith said:

> "I don't like microwave for color. I like color television and I would like to see color television service on something other than microwave, but when you add all of the facts up, I don't see any other way out." (Tr. 224)

In 1950, Dr. Du Mont made clear the type of interest that motivated him to contend that the UHF was ready for

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[5] The microwave even today has not yet been used or field tested in any manner whatsoever for broadcast purposes.

immediate standardization. Thus he testified that the longer the freeze stayed on the more difficult it was for him to expand his network:

> "The Witness: We lost that program because we have not been able to get affiliates with respect to these stations. This hold-up in the hearing down here is creating a very nice little monopoly.
>
> . . . . . .
>
> "I did not say my presence here. I said the fact that the freeze has been on for 13 months—certain people in the industry have been in the business a long time and they have ample affiliates, and they are able to offer more stations on the network then we can. Until such time as the freeze is over that condition is going to continue." (Tr. 5723)

The industry and industry committees have paralleled the Du Mont company position with reference to saving the UHF for black and white television ever since 1941 when Du Mont fell in line with the industry after the defeat of its flexible standards proposal. The only deviation between them since then is that Du Mont in September 1948 recommended utilization of the UHF for black and white television because it foresaw the crowding of the VHF channels a year earlier than the rest of the industry. Significantly, when in 1946 Columbia wished to introduce color on the UHF band, the RTPB made no recommendation to use the UHF. They clearly did not want any [fol. 219] propagation data that would assist the commercialization of color in the UHF at that time. David B. Smith, testifying for the RTPB, said:

> "Q. You do not feel that RTPB came to final conclusions as to the thorough adequacy of the UHF channels for television broadcast service, do you?
>
> "A. Well, from a propagation standpoint, we did nothing. We just did not consider any allocation problems or any propagation problems." (Docket 7896, p. 681)

In 1948 when the Commission invited proposals for utilization of the UHF, the industry committee, at that time known as JTAC, took the position, as has been previously

indicated, that black and white did not need the UHF for expansion, and it claimed that there was insufficient information to establish commercial service in the UHF:

> "In summary, the JTAC finds that additional information on the following topics is required before service areas and interference areas may be predicted with reasonable accuracy:
>
> A) Noise figures of commercially realizable UHF television receivers.
>
> B) Signal/noise ratio, at the viewing screen, giving acceptable service at various bandwidths and for several different systems.
>
> C) Measurements of factors governing normal propagation at frequencies between 475 and 890 megacycles over a variety of types of terrain.
>
> D) Measurements of barely perceptible and objectionable interference ratios (visual and aural) at various bandwidths and for various sy-tems.
>
> E) Selectivity characteristics of commercially realizable UHF television receivers.
>
> F) Measurement of tropospheric factors governing abnormal propagation at various frequencies in the 475-890 megacycle band over a variety of types of terrain and atmospheric conditions.
>
> "All of the above factors are in the Class C (speculation) category at present. Together they constitute a preponderance of the technical information necessary to an allocation plan. Hence, any attempt to formulate an allocations plan, based on present knowledge of these factors, would be without sound engineering foundation:" (p. 30-31, Exhibit 1)

[fol. 220] This industry committee left no doubt that it meant for the commercialization of color to be postponed to the indefinite future, although since 1941 there had been a practical color system that had been field tested.[6] JTAC said:

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[6] See page 1, supra, for number of hours of field tests of field sequential system; see page 43, infra, for field tests of the simultaneous system.

"The JTAC is of the opinion, based on evidence submitted to it by various subcommittees of the RMA and IRE, that it is impracticable to set up commercial standards for color television in the present state of the art.

* * * * * * * * *

"Bandwidths cited to the JTAC as applying to wideband experimental color television systems are as follows:

CBS sequential system: 144 fields—525 lines—12 megacycles

RCA simultaneous system: 60 fields—525 lines—14 megacycles

If it appears advisable to assign 6-megacycle channels to an interim monochrome service on the ultra-high frequencies, two alternatives may be considered to provide for a later conversion to color service. One is to assign the 6-megacycle channels at intervals, interposing an unused space of 6 or 8 megacycles between channels. This would permit the later expansion of each monochrome assignment to a color system assignment having a bandwidth of 12 or 14 megacycles. The second alternative is to assign adjacent 6-megacycle or 7-megacycle channels, with the understanding that half of these assignments would be deleted when conversion to color service takes place." (pp. 34-6, Exhibit 1)

It cannot be said that in 1948 JTAC had any thought for utilizing the UHF for color. In fact, they expressly indicated that use of the UHF for black and white would keep color out of that part of the spectrum. The Report said:

"In view of these facts, the JTAC comes to the conclusion that it will be difficult, both in theory and practice, to provide for a conversation from uhf monochrome assignments to uhf color assignments. The JTAC believes, therefore, that any assignment of monochrome service to uhf channels would represent a permanent removal of the space so occupied from

that available for any other service." (p. 36, Exhibit 1)

[fol. 221] This statement is all the more significant since the existence of 6 mc field sequential color was reported to the JTAC in a letter from Columbia Broadcasting System dated August 16, 1948, included in the same exhibit. (p. 131, Exhibit 1)

It is also significant to note that no JTAC member was interested enough in 6 mc color (the simultaneous system by this time had been abondoned by RCA) to view the performance or review the characteristics with the inventor.

The JTAC and RMA didn't feel the inadequacy of the channels in the VHF until a year after Du Mont foresaw it. In 1949 when the Commission had invited proposals for color television in the 6 mc channel in the 12 VHF and 43 channels of the UHF, JTAC recommended utilization of the UHF.

While not stating specifically that it believed there was now enough information upon which to base the opening up of the UHF, it pointed out the importance of getting stations into the UHF and recommended that the monochrome VHF and UHF allocations be made before *color* was considered. It then set up a long and arduous program for the color question, all of which was to come *after* the black and white problems had been disposed of by the Commission.

> "8. *Recommended procedure prior to adoption of a color system.* JTAC recommends that the following steps be taken *prior to the final adoption of standards for a color service:*
>
> *Step 1.* Establish the allocation for monochrome service on the vhf and uhf bands, in accordance with the present proposal, suitably extended or modified as may appear in the public interest as a result of the evidence taken at this hearing.
>
> *Step 2.* Determine whether or not a suitable compatible or adaptable 6-mc color system exists which may be superimposed on the existing monochrome channel structure. In this determination, the performance and technical advantages, as well as the effect on the existing monochrome structure, of the several

6-mc color systems should be compared. The cost to the public and the extent of use of adaptable and compatible systems should be assessed.

Step 3. When and if it is determined by the Commission that such a compatible or adaptable 6-mc color system, of suitably high performance and suitably low cost, exists, notice should be given of the intention to adopt such a system, and full particulars of the system promulgated to the industry.

Step 4. Prior to such notice, a stated interval of time should be reserved during which proponents of the alternative systems may have the opportunity to demonstrate the comparative performance and costs of such alternatives.

[fol. 222] *Step 5.* Following the determination to standardize on a particular color system, and prior to the final adoption of standards for commercial use, a public field test of at least six months duration should be undertaken to assure that the proposed service can, in fact, be rendered.

Step 6. If it is determined that a compatible or adaptable color system of suitably high performance and low cost does not exist, or if it is determined that it is against the public interest to institute a color service on 6-mc channels, provision for the development of a color service in a region of the spectrum not occupied by the monochrome channels should be made, and a specific reservation of spectrum space for such a service should be made." (pp. 18-20, Exhibit 203)

Although there are many examples showing that the industry has feared the adoption of color television in the same bands with black and white, and that it also has opposed opening up the UHF for color television, the positions of the industry committees and the Du Mont company serve to show on the record that the industry wants black and white television to operate to its full bloom on a national scale in every channel available as the demand grows before color is introduced. We thus find that the Commission decision of March 18, 1947, relied almost entirely upon the evidence submitted by an industry whose motive over a seven year period of time was to delay color.

It is now appropriate to summarize the activity of the industry during this seven year period with field sequential color.

The 1941 decision of the Commission adopted standards for black and white television in the 18 VHF channels. As a part of that decision the Commission had formally urged immediate field testing of color television, and the number of 375 lines and 120 frames were formalized in the Standards of Good Engineering Practice for field testing field sequential color. By 1947 the industry[7] had done nothing substantial in color television to carry out the Commission's formal order or the NTSC's promise of further field testing of color broadcasting. In the 1950 hearing record, the industry again explains that war demands hindered such field tests. It further explains that a period of 18 months after the cessation of organized hostilities, August 1945, was required for reconstruction and rehabilitation of their scientific personnel and physical plant for peacetime research and production. Although Columbia's scientific and laboratory staff was likewise engaged in the war effort, by 1947 Columbia was still the only active proponent of color television immediately. By 1947 CBS had already done more field testing in the UHF than any other company. It had constructed studio and receiving equipment for its system in this band. In addition, it assumed the burden of collecting propagation data in the UHF.

[fol. 223] In the 1946-47 hearing record on Columbia's Petition to adopt field sequential color, RMA industry members testified in support of the RMA and RTPB positions to foreclose color as an immediate competitor of black and white television. Thus RCA made known that it did not want color television introduced concurrently with black and white television. Dr. Jolliffe stated:

> "At the outset I would like to summarize our position:
>
> "First: We have today a well developed monochrome television service. All of the equipment—transmitting and receiving—has been engineered to the point where it is capable of excellent reproduction in the home of the best in current events, sports, drama and education. We urge the Commission to give full

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[7] Except the Columbia Broadcasting System.

support to this proven service and continue to encourage its fullest use for the benefit of the public.

"Second: No steps should be taken under the guise of bringing color television to the public which, instead of advancing the art of television, confuse the public, the broadcaster and the equipment manufacturer and result in depriving the public of any television service now and for some time to come." (Docket 7896, pp. 646-7)

B. Ray Cummings, Vice President of Farnsworth Television & Radio Corporation, said:

"We would say, in conclusion, that:

1. An excellent system of monochrome television is now available and its acceptance and widespread use leading to an economically sound system of broadcasting should not be jeopardized;

2. That there is substantially sufficient evidence, based on the motion picture industry, that monochrome pictures can give entirely satisfactory programs for an indefinite period. There appears, therefore, to be no need for undue haste for the adoption of a color system;

3. Adequate time must be taken in exploring alternative color television systems to insure that the one selected will be most suitable;

4. It is our understanding that the industry as a whole is making a tremendous investment of money and effort at this time to insure the success of the monochrome system. Any dilution of this effort at this time to also include the production of color television apparatus would substantially detract from the prospects for monochrome television." (Docket 7896, pp. 618-20)

We are now in a position to examine the 1946-47 engineering testimony of the industry with respect to field sequential color. The 1949-50 hearing makes crystal clear that the industry's engineers were unsound analysts not only of the field sequential system but also the simultaneous system. Their engineering testimony in 1946-47 is rendered so completely worthless by the 1949-50 record [fol. 224] that the kindest thing that can be said in explana-

tion is that their economic interest blinded their engineering judgment. In view of the position taken in both hearings by witnesses who testified in support of the simultaneous system (which was a complete failure) there is grave doubt that any can be relied upon to predict the potential performance of any system whose adoption might prejudice their economic interests.

In the pages that follow we will discuss the specific engineering questions that were involved in the 1947 decision. The evidence adduced in that record and in the current record show that the CBS system was rejected *as a system* on unsound engineering grounds and that the Commission lacked imagination to encourage the art of color television because it relied upon witnesses hostile to color.

[fol. 225] The Mechanical Myth

The most important error of the Commission's 1947 color decision was the implicit assumption that the field sequential system could only be regarded as a mechanical system. The Commission stated:

> "*At the hearing, Dr. Goldmark testified that the color wheel was not an integral part of the sequential system.* In his opinion, color can be produced under a sequential system by employing three different tubes each one coated with a special slow decay phosphor that is sensitive to only one of the three primary colors. The difficulty with the use of such tubes has already been adverted to. In the first place, *no such system* has yet been built or field tested. Secondly, witnesses for Du Mont testified that the company had made tests with slow decay phosphor tubes but had found them objectionable. Unless or until *a system* which has *the 3-tube system* is constructed and field tested, there is no assurance that it will work successfully. *The Commission, therefore, cannot assume with any degree of assurance that the Columbia system is not limited to the color wheel with the severe restrictions it imposes on picture size in a direct viewing receiver.*" (Emphasis supplied) (11 FCC 1533).

Although not spread upon the record until the current 1949-50 color hearing record (Tr. 7941), Donald Fink had written in the January 1947 Electronics Magazine:

> "The sequential and simultaneous systems have been referred to as mechanical and electronic systems, respectively, but these are not significant designations, since either system can be operated electronically." (Electronics Magazine, January 1947, page 72).

Mr. Fink was a member of RMA and RTPB television industry technical committees which were concerned with engineering presentations in the 1946-47 color hearing.

Du Mont's Dr. T. T. Goldsmith recognized that the field sequential system was an electronic system and actually described the triphosphor tube in the context of being equally applicable to color switching by fields, or to simultaneous transmission of each color on separate channels. He said:

> "The Trichromoscope tube may be employed with either simultaneous transmission color systems, or sequential transmission color systems, giving the highest brightness with the simultaneous system. It provides the advantage or direct viewing in full color by all-electronic means.
>
> "Further tubes of this Trichromoscope type are being constructed, using the triangular pyramid structure impressed directly on the glass at the front of the [fol. 236] tube. With the pyramidal impression it is a simple matter to settle the phosphors in turn on the three sets of faces corresponding to red, blue, and green, respectively." (Docket 7896, p. 1448-50).

Under such circumstances, there was no reason for the Commission to have been misled by continuous reference in the 1946-47 color record to field sequential color as mechanical. Nevertheless, the assumption that the CBS system is mechanical was continually made by the industry which, on the other hand, repeatedly referred to the ill-fated simultaneous system as an all electronic system. This continuous use of the term "all electronic" raised the obvious inference that the field sequential system was not all electronic and was therefore inferior. In fact, Dr. Du

Mont in 1947 implied that a field sequential system could not be all electronic:

> "All electronic color television systems are now under development by several companies. These systems may allow transmission of color television, *not in color sequence by fields*, but in color sequence by picture elements, or by picture lines, or possibly even by simultaneous transmission of all three colors.
>
> "We therefore believe that it is far too early to consider standardizing on a scanning system which is an outgrowth of obsolete mechanical color filters, when electronic developments in color may make it possible in a few years to provide excellent color television free from this fatiguing flicker and cold breakup." (Emphasis supplied.) (Docket 7896, p. 1425-6).

Dr. Engstrom at the same time confused the issue with a little different approach. He claimed that if you made the field sequential system all electronic you practically had a simultaneous system. He said:

> "I am not saying now that one can't do the sequential method electronically, but if you do the sequential method electronically, it isn't much of a step to make it simultaneous, and I think there are some real substantial advantages in doing that." (Docket 7896, pp. 1213-14).

This testimony is clearly erroneous because by no stretch of the imagination can a color system transmitting its color sequentially be the same as one which transmits its color simultaneously on three separate channels. Therefore, Dr. Engstrom could only have been talking about the effect of utilizing equipments making the field sequential system simulate a simultaneous system so far as the receiver is concerned. He could only have had in mind the use of triphosphor tube or three tubes each with a different colored phosphor, which would have the effect at the receiver of simultaneous transmission of the three colors on the television screen. That is to say, if the phosphors, on the single tube or the three tubes, were long persistent the eye would be fooled by the persistence of each color on the screen simulating a full color picture constantly. Dr.

Engstrom, however, did not want to support Dr. Goldmark that when three tubes were used, or when a triphosphor tube was built with long persistent phosphors, the sequential system's alleged flicker problem would be solved. To do [fol. 227] so would have pulled the props from the no-color-now case in 1947.

Testimony such as Dr. Du Mont's and Dr. Engstrom's may have been responsible for the Commission statement in its 1947 decision that "unless and until such a *system* which has the three tube *system* is constructed and field tested, there is no assurance it will work successfully." The Commission lost sight completely of the field sequential, system potentiality when it transposed equipments with systems as synonymous terms. This misconcepetion, fed by Drs. Du Mont and Engstrom and the rest of the industry, led the Commission to recite timidly an elemental fact:

> "Dr. Goldmark testified that the color wheel was not an integral part of the sequential system." (11 FCC 1533).

The Commission, therefore, decided that it

> "could not assume with any degree of assurance" that the field sequential system "is not limited by the color wheel." (11 FCC 1533).

The employment of three tubes each with a phosphor of one of the three primary colors was an equipment problem, *not a system problem.* The FCC had one system being urged for standardization; had it recognized in 1947 as did Fink and Goldsmith that the field sequential system was as electronic a system as the simultaneous system, the Commission might not have fallen into the trap of deferring color on the foregoing ground to await the development of a simultaneous system that never had a successful broadcast. Indeed, there was justification, if proper interpretation of the testimony on this point had been made, to have adopted the field sequential system on the basis of its brightness potential utilizing three-tube receivers.[8]

At least the industry should have been taught three years ago that it could not confuse the Commission by such sham

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[8] The CBS system was, of course, made the subject of public reaction tests viewed on the disc receivers in 1947.

engineering testimony. The industry, however, liked this argument; the 9,700 pages of the current 1949-50 color hearing record is filled again with this misconception regarding the field sequential system. Throughout the record switching the three primary colors by picture elements (dot sequential system) and by lines (line sequential system) are referred to as all electronic systems, while again history is repeating itself—the field sequential system is referred to as the mechanical system.

To start with, JTAC in its testimony represented to the Commission that it was concerned solely with the ultimate system potentialities of each of the color systems it discussed. It claimed that it did not involve itself with matters of apparatus. Nevertheless, in referring to the [fol. 228] CBS system, it limited the CBS system to operation with a disc. Upon cross-examination Mr. Fink admitted that the JTAC table had confused the matter of apparatus with that of system insofar as its report indicated that the field sequential system was limited by the disc. (Tr. 7942-4).

Likewise, Raymond Cosgrove, president of the Radio Manufacturers Association, apparently did not understand the difference between the disc as a matter of apparatus as compared with a system limitation in the field sequential system. In discussing at the beginning of the hearing the possibility of converting existing black and white receivers so that they could receive color, it did not occur to him that any electronic apparatus could be used by the field sequential system. On the contrary, he referred repeatedly to the difference between the all-electronic system as compared with the field sequential system. Some of his testimony is as follows:

> "Now, I don't think manufacturers would stand for a major cost of a conveyor (sic) at the expense of a minor modification of an existing receiver. Our supposition and the information which we have—and I admit it is quite incomplete—indicates that the adapter of the *electronic system* can be made as low in cost as the mechanical adapter. Now, if it can—and with some reservation to mechanical means of doing it and some degrading of the information because of the slower action of it to fool the eye, as I understand it—and I may be getting over my depth in the next sentence—that

the feeling of the manufacturers, reflected in here, is that this adapter on the electronic basis can be made as low in cost as the mechanical adapter." (Emphasis supplied.) (Tr. p. 2247).

General Sarnoff suffered from this same basic engineering fallacy. He was questioned at length concerning his testimony that the field sequential system was built around the disc. Upon questioning by the Chairman, he said:

"The Chairman: But you do say that the disc is the thing that causes you to say that the CBS system is a mechanical system?

"The Witness: That is right.

"The Chairman: And when they eliminate that, if they get a system that works, you would call that an all-electronic?

"The Witness: I would." (Tr. 10323).

When confronted with this misleading distinction, Dr. Engstrom admitted its engineering invalidity but still felt it was proper to call the CBS system mechanical. The following appears in the record:

"Commissioner Jones: There is one further thing, too, in reference to several of the press releases and exchanges between Dr. Stanton and General Sarnoff, press releases, and I believe one press release was [fol. 229] issued by Mr. Jolliffe, distinguishing between —the distinguishing feature of which is between the field sequential and the dot sequential system, which was that one was mechanical and the other was electronic.

"Do you believe that is a fair appraisal of the situation?

"The Witness: To the extent that they have been demonstrated, but not to the extent to which they might be set up.

"Commissioner Jones: Don't you think that beclouds the issue here as to what is involved before the Commission? Both of them are all electronic, or both of them can use three tubes, or both of them can use or all three of them could use your single tube?

"The Witness: I don't for this reason, Commissioner: This one party, CBS by name, has proposed

that the virtue of its system is the low cost, and in their terms, low amount of complexity of the color disc.

"Commissioner Jones: Do you agree—you don't agree, as an engineer, however, that it is basically a mechanical system? Don't you think that gives the wrong connotation to an unsuspecting public?

"The Witness: It doesn't need to be, but the party has not presented it in any other form.

"Commissioner Jones: Well, let us get it this way:

"You don't describe a thing scientifically—as a matter of fact, didn't JTAC make a complete presentation of eight or nine systems here on the basis of not considering any terminal equipment at all?

"The Witness: Not considering—you mean——

"Commissioner Jones: Any terminal equipment, in their tables in analyzing the different systems that might be available.

"The Witness: Of the one committee of RMA that met on the subject, they analyzed the performance of the system, based on what could be obtained in the channel width from certain standards.

"Commissioner Jones: Theoretical:

"The Witness: That is right, that is correct.

"Commissioner Jones: All right.

[fol. 230] "The Witness: But theoretically is almost potential.

"Commissioner Jones: All right.

"From an engineering standpoint, if that concept is correct, isn't it taking a backward step, engineeringwise, to consider a distinguishing feature where the one is a mechanical feature or an electronic feature?

"The Witness: It is on element, but in a procedure of this kind, I suppose it is perfectly proper when a party makes one approach, and we make the approach that we have an electronic system, that in the camera we have three camera tubes, and the party calls attention to the fact that we have a registration problem, isn't it perfectly logical and fair that we should say, 'Yes, you say you have a mechanical system' • • • 'You have an electronic system, but you have only demonstrated a mechanical system.'

"Commissioner Jones: Don't you think it would be better to clear the issues so that the public may be

advised to call them as you see them, and each pointing up their Achilles' heels, as they are, instead of dragging a shibboleth out?

"The Witness: I would like that better, certainly." (Tr. 7888-90).

Once and for all, there is no reason for the Commission to hold up a color decision in the present hearing for the false reason that field sequential is a mechanical system. From a consideration of systems, if the systems can be appraised presently and potentially with any equipments which demonstrate their system's worth, there is no justification to require a particular receiver equipment to be utilized before standards are adopted, as long as satisfactory pictures have been produced. CBS has demonstrated its system on receivers with mechanical filters and on non-mechanical tri-phosphor tubes. The tubes on the CBS projection set have the same phosphor decay coefficients as the single direct-view tube of RCA. Even the opponents of field sequential color have agreed that the RCA tri-phosphor tube will work as well on the field sequential color system. From a systems standpoint, whether a mechanical, a projection, or a direct-view single tri-phosphor tube is used is of no more consequence to the Commission's final decision than the finish of the receiving cabinet, and certainly not more than the installation of the continuous or snap tuning of channels in the receiver.

[fol. 231] Picture Brightness

There is no definitive record on this subject prior to 1946 with reference to color television specifically. In the 1941 hearing the question was considered with reference to frame rate and flicker problems which will be discussed under those subjects hereinafter. However, prior to this time no one had produced a black and white picture bright enough to involve any of those problems during that period. Black and white reception was a very dim affair then.

By 1947, however, the brightness of colo. pictures was a major issue in the color hearing on Columbia's petition. In the March 18, 1947, decision, the Commission said:

"The brightness with which a picture can be produced on a television screen is one of the most impor-

tant performance characteristics of a television receiver." (11 FCC 1527)

The Commission considered this question strictly on a demonstrated basis. It rejected all theoretical calculations or future potential of the sequential system proposed by Columbia.

Thus it rejected Columbia's evidence of laboratory performance of its system in 1947 as follows:

> "Dr. Peter C. Goldmark . . . stated that Columbia had developed a receiver in its laboratory which was capable of producing 22 footlamberts of illumination. *However, at the hearing in New York, none of its receivers developed more than 15 foot lamberts.*" (Emphasis supplied) (11 FCC 1527)

Again the industry intermixed systems considerations with equipment limitations of the time (1946-1947). The industry judged the CBS system from a purely available equipment point of view. RCA's tactics were clearly representative of industry tactics. Ray D. Kell for RCA testified as follows:

> "Picture Brightness: A mixture of phosphors producing white light is used in the kinescope for the mechanical sequential projection receiver.
>
> "The color is then achieved by placing a rotating filter disc in front of the kinescope. This disc reduces the light output by a factor of approximately eight times. From previous testimony, I believe that should be changed to ten times." (Docket 7896, pp. 729-30)

When he described RCA's simultaneous receiver he multiplied the light potential of the simultaneous system by a factor of three because there are three tubes utilized, each coated with phosphors of one of the three primary colors:

> [fol. 232] "In a simultaneous receiver this loss of light does not occur, since each of the three kinescopes has the most efficient phosphor for producing only its own color and operates without filters, except a low-loss trimmer filter on the red.
>
> "In addition, the simultaneous receiver has three kinescopes operating all the time, each contributing to

> the total light, instead of one, as in the sequential receiver. This results in an additional advantage of three to one in favor of the simultaneous system, under present operating conditions." (Docket 7896, pp. 729-30)

Nowhere did he point out that CBS could use the same three-tube apparatus that RCA used.

To dramatize to the point of burlesque their fallacious reasoning, that color was on the horizon of brighter television pictures, the Du Mont company demonstrated a black and white set alongside the 15 foot lambert Columbia color sets. The Commission's decision of 1947 describes what the industry represented was the trend in black and white television brightness.

> "In contrast, Allen B. Du Mont Laboratories, Inc., demonstrated black and white direct-view receivers that produced an average highlight brightness as high as 750 feet lamberts and Philco Radio Corp. displayed a projection type of receiver which produced an average highlight brightness of approximately 35-foot lamberts." (11 FCC 1527)

But in the 1949-50 hearing Dr. Du Mont admitted that the black and white system had no need for brightnesses of 750 foot lamberts. He said:

> "No, we never said we needed it. We did show a receiver with 750 foot lamberts, but we never said that that was necessary," (Tr. 9504)

In addition, the Commission was unsound in giving any weight whatsoever to this abnormal representation of what the highlight brightness would be in black and white receivers in the immediate future. The 1949-50 color hearing record shows that three years later the average maximum highlight brightness of black and white receivers for sale of dealers' floors is 17-foot lamberts as measured by John V. L. Hogan, Chairman of 1950 NTSC allocations Committee. (Tr. 9916) 417 readings by Hogan showed:

> ".7 percent had illumination between 4 and 6 foot lamberts. On the right-hand side also happens to be .7 percent, the last step between 28 and 30 foot lam-

berts. The largest percentage was found—in a 2 foot lambert step was found between 18 and 20 foot lamberts, where 22.3 percent of the sets are." (TR.8876)

[fol. 233] And in the 1949-50 hearing record Du Mont's T. T. Goldsmith testified on cross-examination that 52 foot lamberts was the maximum highlight brightness for a Sussex receiver—a luxury receiver which would have a much greater brightness than most receivers in the hands of the public.

Paramount Pictures, Inc., likewise joined in appraising the brightness potential of the field sequential system with contemporary equipment. Paul Raiburn of Paramount leveled his guns at the disc of CBS receivers. He testified:

> "But above all the primary requirement of a high light level seems to render completely unsatisfactory *any system* of television which throws away 90 per cent of the available light as does the proposed sequential color disc system." (Emphasis supplied) (Docket 7896, p. 1304)

Philco's David B. Smith followed the same line typing the potential of the field sequential system to the 15 foot lamberts obtained on receivers demonstrated on the record with a disc. First he described the tendency toward brighter black and white pictures. He saw improvements in technology of black and white screens but he saw no development of slow decay phosphors of the three primary colors for color television. He developed his double standard of improvement in equipments for black and white and none for color as follows:

> "The point we want to make is just this, that in the last five years there have been a substantial series of developments, all heading towards brighter pictures. We do not regard this picture as bright enough by any manner or means, and we hope to make it brighter. But in the last five years we have seen improvements in the technology of screen materials which has raised their efficiency by factors 4 and 5 times, seen the development of high gain screens, increased projection, which has further increased the bright factor 4 or 5 times.

"In our opinion, this development is not going to stop at this time. We think it not unreasonable, within the next two or three or five years, that there will be similar improvements in the art which will eventually get pictures in our living room as bright as we really want. Now, when you stop to think that the view from your window may well run into several thousand foot-lamberts, it seems a little silly to us to tie the thing down to a system that has to limp along in semi-darkened rooms, substantially completely dark, as they were in New York Monday." (Docket 7896, p. 1253)

The Commission in the March 18, 1947, decision, denying standards for field sequential color concluded with reference to brightness:

[fol. 234] "4. The Commission is of the opinion that on a question as to just how much brightness is n-cessary for home viewing under normal ambient ligting conditions, there is no substitute for actual tests in homes under a wide variety of circumstances. It is not possible to theorize on what the public will find to be generally acceptable. Adequate tests must be made at numberous home receiving locations. In many homes, the space is so arranged that lights from windows or from lamps or overhead lights will, unavoidably fall directly on the face of the receiver, being just as bad or worse than the conditions in the hearing room. Moreover, receivers will undoubtedly be placed in public places, such as auditoriums, hotel lobbies, etc. Tests should cover this type of situation as well as more ideal test situations. Until a sufficient number of tests has been made, the Commission is unable to conclude that the brightness of the Columbia picture is adequate for home use." (11 FCC 1528)

The Commission, in making this conclusion with reference to brightness, lost sight of the fact that as early as September 1940 the engineers of the industry by a vote of 33 to 4 decided that the brightness of the color demonstrated by CBS was in their estimates acceptable. It is most important that when this demonstration took place in 1940, the highlight brightness of the CBS pictures was about 2.5 foot lamberts. (Tr. pp. 2505, 3162) The Commission accepted

the testimony of the industry engineers in 1947 that the 15 foot lamberts demonstrated by the Columbia system in New York were not sufficiently bright for commercial television service. At the same time, they judged a potential highlight brightness capacity of the sequential system on the basis of the effective highlight brightness of the disc receivers demonstrated. It appears clearly that they swallowed hook, line, and sinker the criterion used by the industry that the field sequential system was limited in effective highlight brightness by the disc. Furthermore, it never occurred to the Commission that the utilization of three tubes each coated with primary phosphors as described by Kell as an integral part of the simultaneous system might also be used by the field sequential system to appraise the effective highlight brightness of that system.

In the foregoing, the Commission was unsound from a technical standpoint in judging the field sequential system highlight brightness potentials. It is demonstrated in the current hearing record that they lacked imagination with reference to appraising the field sequential system's brightness potential. Exhibit 211 shows schematically that the CBS system can use any electronic device or receiver that the simultaneous, the dot sequential, and the line sequential systems can use.

The record makes clear that so far as the existing disc receiver is concerned, adequate brightness, is achieved. Thus, Dr. Judd, of the National Bureau of Standards, in discussing the superioity of the CBS pictures over those demonstrated by other proponents, stated that this superiority "consisted in clear pictures, *adequate brightness*, and freedom from any misregistration." (Tr. 9315) (Emphasis [fol. 235] supplied) Furthermore, Exhibit 276, filed by Du Mont, states that disc type receivers in the field sequential system achieve acceptable brightness (Tr. 5737). This exhibit states: "Direct view color receivers of a mechanical type have acceptable brightness". Dr. Du Mont, visibly embarrassed by this statement, repudiated this engineering representation of his own laboratory. (Tr. 9562-63)

In addition to the testimony of Dr. Judd and the Du Mont exhibit, the public reaction tests conducted both by Dr. Dunlap and CBS itself establish beyond any doubt that the brightness of existing disc receivers is completely satisfactory to the American public. As a matter of fact, if any-

thing, the brightnesses are too high already. The Dunlap survey specifically discloses 75% of those interviewed thought the brightness was "just about right", 23% throught the pictures were too bright, and only 1½% felt that the pictures were not bright enough. (Tr. 6316) The Columbia survey indicated that color pictures of 7 to 9 foot lamberts and from 15 to 25 foot lamberts with ambient illumination varying from 1 to 7 foot candles were considered as having the right amount of brightness by more than half of the viewers. 44.9% rated such color pictures as too bright (with 40.9 limiting this by stating, "a litfle too bright") and only 1.1% stating that the pictures were a little too dim.

In addition, the field sequential color system has been demonstrated in this record to be able to produce brightness much higher than that having overwhelming acceptance in the public reaction tests. There is no limit within the framework of an acceptable broadcast service for the operation of the field sequential color system. Brightnesses of the magnitude of which the field sequential system is capable are in fact wholly unnecessary, however, for a broadcast service, as will be discussed hereafter under the subject of flicker.

[fol. 236] *Contrast*

In its March 18, 1947, decision, the Commission gave no weight to the relationship of effective brightness to contrast. It was not sure enough of the scientific principle to assert it as a finding. The Commission contented itself with the following:

> "Dr. Goldmark testified that these differences in brightness were not significant because in his opinion the brightness of the Columbia picture was adequate and that the added brightness was, therefore, not necessary. Moreover, according to Dr. Goldmark, once adequate brightness has been provided for, it is more important to concentrate on contrast in the picture than on added brightness. By 'contrast', Dr. Goldmark refers to the relative difference between the whitest white and blackest black in a picture. According to Dr. Goldmark, a ratio of at least 30 to 1 contrast is needed if a satisfactory picture is to be produced."

Throughout the hearing, as has been pointed out above, the industry engineers used existing apparatus to limit the description of the field sequential system in 1947. Since it accepted this criterion of judgment on all other points, the Commission had an opportunity to find positively that the highlight brightness of the field sequential color receiver requires only a fraction of the highlight brightness of black and white receivers. Filters in the disc consume 90% of the ambient light in the room and upon reflection from the face of the tube again, the disc filtered another 90% of the remaining ambient brightness of the room, leaving only 1% effective on the field sequential color picture. On this record the apparatus gave the field sequential color system advantages over the black and white system, and the Commission disregarded it.

Dr. Goldmark explained the difference between the use of a disc in field sequential color and the absence of a disc in black and white pictures assuming an ambient illumination in the room of 20 footlamberts. In viewing the color picture at 20 footlamberts room illumination, 90% of the ambient light was filtered by the disc when it reached the face of the tube and another 90% was filtered again by the disc when it was reflected from the face of the tube. Thus the effective ambient room light upon the color picture was 1% of 20 footlamberts, or .2 footlamberts. Therefore, to maintain a 30 to 1 contrast ratio in the color picture, a receiver highlight brightness of only about 6 footlamberts was required. However, with a black and white television set where the room illumination is 20 footlamberts, ¾ of the ambient illumination, or 15 footlamberts, was reflected from the face of the tube. Since the darkest black in a television picture can be no darker than the reflected ambient illumination in the room, which in this case was 15 footlamberts, in order to maintain a 30 to 1 contrast ratio, it would be necessary to have a highlight brightness of approximately 450 footlamberts—30 times 15 footlamberts. [fol. 237] Thus Dr. Goldmark said:

> "Hence, if you want to get the same enjoyment, the same contrast, as in this photograph, namely, thirty to one, you should have the brightest portion in the picture thirty times as bright as the reflected light from the screen.
>
> "Now, I said fifteen footlamberts were reflected;

that you get, whether there is light on the screen or not. You multiply that by thirty, and you get 450 footlamberts highlight brightness only where the black-and-white receiver is run at the brightness where the highlights are 450 footlamberts high will it give the same satisfaction as a color picture run at twenty footlamberts." (Docket 7896, p. 326)

Accordingly, had the Commission followed the criterion that the industry used and that it used in its decision, the 15 foot lamberts of highlight brightness for the CBS picture as demonstrated with a contrast of 30 to 1 should have satisfied the Commission as to adequate brightness of the field sequential system in 1947. This the Commission refused to do. This amounted to failure on the part of the Commission to recognize one of the great advantages of the field sequential color system's use of the disc receiver.

[fol. 238] Flicker

Heretofore we have shown that the field sequential system potentially can develop all the light that is necessary for an adequate color system. In the 1946-47 hearing the industry said in effect that even if the field sequential system can generate sufficient light for an adequate color system, the color frame rate (24 color pictures per second; 48 primary color frames) places too low a ceiling on the objectionable flicker threshold for an adequate color system. This it was stated that the maximum brightness without flicker which the field sequential system could achieve was about 23 foot lamberts.

The Commission's position on the objectionable flicker threshold for the field sequential system is stated in the 1947 decision as follows:

"In summary, the Commission is unable to conclude from the evidence that the brightness of the Columbia picture is adequate for home use under normal circumstances or that it can achieve such brightness without encountering objectionable flicker. In the absence of more convincing evidence on the point, the Commission is of the opinion that on the point of brightness and flicker alone, the risk of approving the Columbia standards at this time is that color television might

be forced to limp along with a picture that is not sufficiently bright for general home use or is subject to objectionable flicker." (11 FCC 1531)

The Commission in its foregoing conclusion accepted the industry's view that the threshold of objectionable flicker was at a much lower level than the effective highlight brightness of existing black and white receivers. They claimed that in the foreseeable future the black and white standards provided ample opportunity for 100 footlambert highlight brightness without objectionable flicker. In accepting the doctrine of the industry, the Commission used against CBS that portion of its testimony which confirmed the industry position. It said:

"However, even if we use the testimony of Columbia's own witnesses, flicker becomes apparent (i.e., 'threshold flicker') at 23-foot lamberts and begins to be objectionable (i.e., maximum tolerable flicker) at 52-foot lamberts. As has already been pointed out, on the basis of the evidence before the Commission, there is no real assurance that greater brightness is necessary for normal home viewing conditions." (11 FCC 1529)

There was no valid reason for the industry to misjudge the field sequential color system employing 24 color picture frames per second or 48 primary color frames per second, because as early as 1940 these same industry witnesses had appraised a black and white television system of 24 frames or 48 fields and found it satisfactory for a commercial television service so far as effective highlight brightness of pictures was limited by flicker threshold. To demonstrate that flicker was not a problem with a 24 frame system, it is [fol. 239] necessary only to examine the testimony of two outstanding electronic engineers during the 1940 television hearing. Thus, David B. Smith testified for Philco in 1940 as follows:

"The Witness: The Du Mont proposal is being considered by the RMA. We have asked through the RMA that certain additional tests be made. We don't have complete information on that subject. We do have an open mind on it. We want to point this out,

that it is perfectly possible and has been demonstrated time and time again, both in the moving picture industry and in the British television practice, to cut the number of frames down to 24 frames, that is, a field frequency of 48. Now, that change from 60 to 48 does not require—In other words, you are still keeping within the retentivity of the eye which determines whether or not you have flicker." (Docket 5806, pp. 276-7)

And Dr. Engstrom testified as follows:

"Q. How many frames per second do you need to have to get a picture without a flicker?

"A. For apparatus that is practical, I should say that you should have at least 24 frames per second and a field frequency of 48 per second. Now, at a frame frequency of 24 per second and a field frequency of 48 per second, and considering the fact that 60-cycle power is the accepted and usual power supply frequency in this country, the problem placed on the receiver is a very difficult one, because things that we know of as hum, as a result from those power supplies, show up on the picture and have a very detrimental effect. Now, receivers could be built for 24 frames and 48 fields but they would be more expensive and they would not perform as well as receivers built for 30 frames and 60 cycles, and the reason for that is that there must be an energy relationship between the frame frequency and the power supply frequency." (Docket 5806, pp. 937-8)

It is to be noted that in rejecting the 24 frame black and white system, Dr. Engstrom relied solely on the matter of power supply, which we now know was never a real engineering problem.[9] He did not find any fault at all with the 24 frame system so far as flicker is concerned.

By the time the 1946 hearings on color had started, the [fol. 240] industry and the Commission had forgotten the

[9] In building receivers the industry thought at the time that a television system employing 60 fields per second could be more easily manufactured than a 48 field system in view of the 60 cycle power supply.

industry's testimony in 1941 on the adequacy of pictures unlimited by flicker in a 24 frame rate system.

It will be noted that the foregoing statements made in 1940 were based upon the calculated maximum highlight brightness that the system of black and white would generate at the 24 frame rate without reaching the point of objectionable flicker. We have also seen, as discussed heretofore under brightness and contrast, that the industry used the apparatus demonstrated in 1947 to establish that the CBS system could not achieve adequate brightness. With reference to the maximum brightness of the CBS system as demonstrated, they had said that 90% of the tube light was filtered out by the disc; the Commission accepted this apparatus reasoning to establish the maximum brightness of the *system*.

But when they approached the subject of maximum highlight brightness of field sequential color pictures for the purpose of discussing flicker, they found it served their purpose to talk about it theoretically without reference to existing apparatus—disc receivers. Specifically, they now wished to judge the field sequential system potential highlight brightness on the same theoretical basis that they were judging the black and white system. In other words, they wanted to use the brightness potential of the black and white system to kill off the field sequential system on the grounds of its reported low flicker threshold. On this basis, David B. Smith said that the field sequential system could never provide satisfactory brightness below the level at which flicker would become objectionable. He said:

> "In our view, it would be a serious mistake to establish a brightness ceiling for color television lower than that of the present black and white service, which would be the case if the proposed standards are adopted." (Docket 7896, p. 519)

Dr. Goldsmith also treated the field sequential color system demonstrated with discs as if the discs with their contrast capabilities were not present. He compared the brightness that would be needed for a 60 field system with a 48 field system on this basis, and concluded that flicker would be objectionable in the field sequential system at 24 footlamberts, thus making unuseable brightnesses above

24 footlamberts which he claimed were necessary for an adequate commercial color system. He said:

> "Color receivers providing 20 footlamberts have been demonstrated.
>
> "It is our opinion, however, that brightnesses far higher than 20 footlamberts are necessary for satisfactory color program reception. A tube, such as the Trichromoscope, can produce brightnesses of several hundred foot lamberts. Very objectionable color flicker will occur with brightnesses of this magnitude. Accordingly the color repetition rate of 48 per second is not adequate for a color television system. We suggest [fol. 241] that a repetition rate of 60 per second will probably be satisfactory, particularly if a simultaneous method of transmission is employed." (Docket 7896, pp. 1450-1)

RCA buttressed the Philco and Du Mont positions that highlight brightnesses much higher than that demonstrated by CBS were on the immediate horizon in 1946-47. Thus, George L. Beers testified that for a 10-inch receiver a normal brightness is 60 footlamberts.[10] He said:

> "In the case of the 10-inch receiver the highlight brightness in footlamberts which we consider to be normal for that receiver is 60. I believe reference was made to a receiver which gave a highlight brightness of only 20 footlamberts.
>
> "The only comment I could make there is that it is quite possible the receiver is not in proper adjustment. There is an ion trap employed in that receiver which must be properly adjusted in order to obtain maximum brightness, and although it happens in very rare instances it is, of course, possible that the receiver might be defective." (Docket 7896, p. 766)

At the demonstration by CBS of its field sequential color receivers in New York in 1947, Du Mont had black and white direct-view receivers which could produce 750 footlamberts

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[10] As has been indicated above, John V. L. Hogan's study of the highlight brightness of existing black and white receivers indicates that even today the average highlight brightness is but 17 footlamberts.

of highlight brightness, and Philco had a projection receiver that could produce pictures of 35 footlamberts highlight brightness. However, as the very record indicates, the effective highlight brightness without objectionable flicker was not 750 footlamberts but was about 280 footlamberts. This is established by Commissioner Jett's observations that at 280 footlamberts he personally got flicker. Commissioner Jett's observations are as follows:

> "Commissioner Jett: I would like them to reduce the highlight brightness of the white picture, the black and white picture, to about 280 footlamberts, to see whether or not the flicker had disappeared.
>
> "I personally get a flicker at that high brightness. I don't know whether anyone else does or not." (Docket 7896, p. 1066)

[fol. 242] All of this presentation by the industry, both of black and white receivers with circuits built in them which would produce highlight brightnesses much higher than those on the commercial market both in 1947 and 1950, and the testimony that in the immediate foreseeable future black and white commercial television receivers would create useful highlight brightness of 100 footlamberts, could only have been intended to mislead the Commission into believing that the field sequential pictures could either not achieve a highlight brightness of high magnitude or that if they did they would pass the point of objectionable flicker.

In summary, when the industry considered the problem of flicker threshold for the field sequential system, it pretended to discuss the maximum potential highlight brightness that could be achieved with a 48 color frame rate on a theoretical basis. However, it was misleading in its representations as to the maximum potential highlight brightness of the field sequential system since its premises for objectional flicker threshold were based upon fast decay phosphors in use at the time on black and white television apparatus. The coefficient of decay of these phosphors is not 1/30th of a second (the frame rate of black and white television) nor 1/60th of a second (the field repetition rate of black and white television). As a matter of fact the phosphors decay so fast after impingement of the electron beam upon them that they are readily used by the field sequential color system at the rate of 144 fiel-s per second without leaving any smear upon the picture utilizing the color discs.

What the industry refused to take into account was the use of long persistence phosphors. Dr. Goldmark, however, testified with reference to raising the highlight brightness potential of field sequential color without flicker utilizing long persistence phosphors. He said:

> "If pictures brigh-er than 25 footlamberts, which is the upper limit of presently available equipment, are desired, merely increasing the color frame frequency is not the answer. The solution will lie in electronic color tubes on which many organizations, including ourserves are now working.
>
> "When these tubes are fully developed, they will automatically carry with them additional protection against flicker in the form of long peristence phosphors which, as I pointed out in December, would raise the flicker threshold illumination to 110 footlamberts." (Docket 7896, pp. 1600-1)

The Commission did not give weight enough to Dr. Goldmark's testimony to make a finding on this point, even though Dr. Goldmark referred to the work done by Dr. Engstrom in support of his thesis. Dr. Goldmark quoted the following from Dr. Engstrom's study:

> [fol. 243] "Mr. Plotkin: Have any tests been conducted to show the effect that you have just described; towit, that the longer persistent phosphors mean a bettering of the flicker situation.
>
> "The Witness: I am coming to that later. Tests have been conducted in this direction by Mr. Engstrom in 1935.
>
> "I would like to refer to Exhibit 91—CBS 125—which illustrates why the flicker threshold will be increased by such a large factor, namely, 5." (Docket 7896, p. 1601)

The Commission timidly adverted to Dr. Goldmark's testimony concerning the use of long persistence phosphors to raise the flicker threshold of the field sequential system. But more important still, the Commission decision did not accept the evidence that the flicker threshold was not a limiting factor on brightness for the field sequential system and could be solved by long persistence phosphors, then

called slow decay phosphors. The Commission merely recited the claims of CBS as follows:

> "Another possible solution was suggested by Dr. Goldmark. He testified that it was possible to increase brightness without changing the frame rate and still avoid flicker. This could be done, he stated, by employing tubes with a slow decay phosphor. Dr. Goldmark admitted that such tubes have not yet been developed. Moreover, R. C. A. testified that it had experimented with such tubes and found them to be very complicated. Witness for Du Mont testified that that company had also conducted experiments with tubes having slow decay phosphor but found them objectionable. Apparently such tubes resulted in objectionable trails being left on the face of the tube. It is not possible to resolve this dispute until tubes of the type described by Dr. Goldmark are in fact developed and are sufficiently field tested so that it can be stated with assurance that they will work satisfactorily." (11 FCC 1530)

In summary, when the field sequential system uses black and white set receivers with a disc mounted in front, the phosphors on the face of the black and white receiver have decaying rates of 1/144th or less of a second because they do not produce smear on the color picture. Therefore, the flicker threshold of 23 footlamberts for the disc receiver as asserted by the industry is probably correct. On the other hand, when black and white receivers with 1/144th of a second decay rate phosphors are not used, and a triphorsphor tube of the Lorenzen, RCA or Lawrence type is employed, phosphors can be utilized which would have a decay coefficient as long as 1/24th of a second (the color picture frame rate of the field sequential system). This is amply proved by the 1950 record, as will be discussed hereinafter.

It was necessary for the 1947 Commission to have made this distinction in the generalized testimony of the industry [fol. 244] witnesses who are attempting to lick the field sequential system by disregarding the science of phosphor decay. In failing to make a proper engineering appraisal of the science of phosphor decay, and in failing to recognize

that the industry was shifting signals in its testimony, the Commission came to the erroneous conclusion that:

> "In the absence of more convincing evidence on the point, the Commission is of the opinion that on the point of brightness and flicker alone, the risk of approving the Columbia standards at this time is that color television might be forced to limp along with a picture that is not sufficiently bright for general home use or is subject to objectionable flicker." (11 FCC 1531)

To find how wrong the industry was in 1947 concerning the effective highlight brightness potential of the field sequential system in relation to objectionable flicker threshold, we need only refer to the present hearing record wherein the field sequential system was demonstrated on an all electronic receiver with highlight brightness of 600 footlamberts on the face of the tube. The long persistence phosphors utilized on the CBS tube have the same coefficient of decay as the RCA tri-phosphor tube.

The field sequential system when it is viewed on a direct-view electronic receiver simulates simultaneous transmission of the three primary colors as reproduced on the face of the tri-phosphor tube by reason of the characteristics of the long persistence phosphor. There is no evidence in the record that anyone witnessing the demonstration in New York saw smear, although Mr. Fink [11] and Dr. Gold-

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[11] Mr. Fink's testimony of course was given before his recent trip to Europe. In a report of the CCIR dated June 30, 1950, and based on actual observations he made in Britain of a demonstration of black and white television of 50 fields per second, he says:

> "Studies of Flicker
>
> "Tests conducted at the RCA Laboratories in Harrison, using members of the study group as observers, revealed that images scanned at 60 fields per second could be viewed at highlight brightness from 50 to 8 times greater than when scanned at 50 fields, for the same visibility of flicker. This fact, which had been advanced by the U. S. delegation at Zurich in support of the 60-field American standard, impressed many of the delegates as justifying adoption of the 60-field

smith predicted that smear would appear. Commenting on this testimony, Dr. Goldmark said:

> "My earlier testimony that there is no practical ceiling on brightness of CBS pictures for the future was demonstrated on April 26, 1950 in New York with the use of longer persistence phosphors as used in the CBS all-electronic projection receiver, and also in the [fol. 245] RCA tri-color tube. The use of such phosphors with the CBS system will permit pictures free from flicker well over 100 foot lamberts.
>
> "The green picture employing a long persistence phosphor shown in the tube in New York and shown to the Commission on April 26 was 600 foot lamberts bright.
>
> "Dr. Goldsmith in his testimony the other day, and Mr. Fink earlier, ignored that fact that there are phosphors such a willimite. As a matter of fact, willimite was one of the first phosphors ever used in television tubes, and the green phosphor was used in the earliest RCA field test receivers.
>
> "This willimite is also known as zinc orthosilicate, which has such a characteristic that it alone permits

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rate. But a demonstration of flicker reduction using a long-persistence black-and-white silicate phosphor, at the Philips laboratories in Eindhoven, had the opposite effect, with the result that all the conferees except the U. S. delegation voted for the 50-field rate.

. . .

"Using this silicate phosphor, the highlight brightness for tolerable flicker was increased about 7 times over that permissable with a short-decay sulphide white-light prosphor, when both operate at 50 fields. The increase in brightness in going from 50 to 60 fields, with short-decay phosphors, is about 6 times. Accordingly, the long-decay phosphor provides an improvement, at 50 fields, about equal to that in increasing the field rate from 50 to 60 per second."

It should be noted that the CBS system has a primary color field rate of 48 which, because of its close approximation to 50 fields per second, makes Mr. Fink's observations equally pertinent to the field sequential color system.

raising the flicker threshold brightness by an appreciable factor, namely five times. I say if the other two phosphors didn't even have long persistence, just if the green were long persistence, it would raise it approximately five times, and at the same time produces no effect of smear whatsoever, in view of the fact that its luminosity after excitation decays to a negligible value within 1/24 of second, which is the picture period of the CBS system.

[fol. 246] "Drs Goldsmith and Mr. Fink talked about smears and trails and were ignorant of the characteristic of this type of phosphor.

"Now this willimite phosphor is used in the RCA tri-color tube, and was used in the CBS all-electronic receiver in the fall of 1948 when we demonstrated that receiver to the Commission and, of course, on April 26, 1950." (Tr. 11226-7)

The testimony of Dr. Goldsmith that the field sequential system could not reach a highlight capacity of 100 foot lamberts without flicker is also discredited; Dr. Goldsmith had stated:

> "And if you go up to brightnesses of the order of that currently used in black and white television of 100 foot lamberts, then the flicker would be very definitely objectionable." (Tr. 5352)

JTAC, which claimed that it was basing its report solely on system potentialities, did not fully recognize long persistence phosphors as being within the system capabilities of the field sequential system. It did, however, refer to them in a footnote in connection with the elimination of color breakup. It stated: "Longer persistence phosphors, as used in the all-electronic receiver, have almost eliminated color breakup." This table shows the utter confusion of JTAC in mixing system with apparatus. As we have pointed out, it presumed a color disc was necessary in that part of the report dealing with how you get color in the CBS system. However, when it discussed color breakup it referred to both all-electronic receivers and longer persistent phosphors. But lo and behold! when it discusses flicker it fails to mention the effect of longer persistent phosphors on raising the flicker threshold and effective highlight brightness of the CBS system.

The attitude of the industry toward the question of flicker

in connection with the field sequential system is further illustrated by the fact that at the CBS demonstrations in October 1949, many representatives of the industry testified that they saw flicker in the CBS pictures. Since the CBS highlight brightness during the October 1949 demonstration was about 20 foot lamberts, it was most unlikely for anyone to have seen flicker in the pictures since the flicker threshold for the type of receiver demonstrated was in the neighborhood of 23 to 24 foot lamberts. While it would be possible for some people at a viewing distance of 4 to 1 to see flicker at a highlight brightness of about 20 it is almost completely impossible for anyone to see flicker on a 10-inch receiver at that brightness when the viewing distance is more in the order of 15 to 1 if not more; and that is the distance at which some of these observers stood who claim they saw flicker on the CBS receiver. It is significant that those who testified that they saw flicker under these conditions were all representatives of the DuMont and Philco companies who had made the theoretical predictions that flicker would be present long before the maximum effective highlight brightness of the present day receivers was reached.

[fol. 247] Thus, it will be seen that in 1947 and 1950 the record established that maximum effective highlight brightnesses of much smaller magnitude than present day black and white receivers may be utilized to give an excellant color picture with a field sequential system using a filter disc in front of the black and white kinescope. This true because a contrast ratio of 30 to 1 is maintained. Of almost 12,000 people who have viewed the color disc picture, very, very few have found it to be unsatisfactory, and a very small percentage found any defects.[12] Further, the potential

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[12] On March 27, 1950, Dr. W. R. G. Baker said in an address:

"On the other hand, the real figure of merit to be attached to any system of standards cannot be accurately measured by engineering considerations. The real measure which is not subject to controversy is the acceptance by the public of the system of black and white television made possible through the application of a specific set of system standards. That is, the market place is the final judge of acceptibility." (Dept. of State Publication Serial #686, Document #9)

maximum effective highlight brightness without objectionable flicker has been demonstrated on the record with the all-electronic tube on a projection receiver at highlight brightnesses of 600 footlamberts on the face of the tube.

[fol. 248] Channel Width

In the 1947 decision the Commission made the following statement with reference to bandwidth required by the field sequential system:

> "Secondly, further experimentation should be conducted along the line of finding methods of transmitting color television over narrower channels. Under the Columbia proposals, each television channel would be 16 megacycles wide. That means that the band 480 to 920 megacycles would accommodate but 27 channels. It was the Commission's hope in allocating the band 480 to 920 megacycles for television that in this band it would be possible to provide for a truly nationwide competitive television system. The evidence before the Commission shows that 27 channels may not ultimately be enough to provide for a truly nationwide competitive television system. Every effort must, therefore, be made to narrow the band width required for color television. It should be emphasized that narrowing the band width should not be at the expense of picture brightness, picture detail, color fidelity, or other features of television performance. The objective should be a narrower band — it would be possible to provide for a truly nationwide competitive performance." (11 FCC 1535)

Whatever may have been the motives of the parties in not proposing to the Commission 6 mc field sequential color, the Commission itself should have remembered that the work on the field sequential system in 1940-42 was in the 6 mc channel. The recommendations of the NTSC, subsequently incorporated into the Commission's first Standards of Good Engineering for black and white television, proposed field testing of the field sequential color system in 6 mc bands with 375 lines, 120 fields. While it is true that some more work would have been necessary in 1947 to put the field sequential system back into a 6 mc bandwidth, the testimony throughout the proceeding and the Commission's

decision apparently was confined solely to 16 mc with reference to the field sequential system.

Since it was generally known in the industry that field sequential color could be achieved in 6 mc, the Commission was unsound in turning down field sequential color on the specific ground of bandwith without further consideration of the possibilities of 6 mc color.

[fol. 249] Color Fidelity

No one has ever seriously contended that the most important aspect of a color system, the *color fidelity*, does not meet up to the highest standards in the field sequential system. Dr. Geer on the record testified that we cannot expect much better quality from a color system. (Tr.3923)

Dr. Judd testified as to the reliability of the CBS field sequential system. He said:

> "I would say that it is my impression that the color rendition by the CBS system has been uniformly good. The color pictures shown by the RCA and the CTI systems have been occasionally good and occasionally bad . . . I would say the CBS pictures were uniformly better, but that the margin which they had did not consist essentially of color fidelity. It consisted in clear pictures, adequate brightness, and freedom from any misregistration." (Tr. 9313, 9315)

With reference to the CBS system, he was so satisfied with the quality of the CBS picture that he stated he would like to buy a color receiver if CBS were adopted, even though he did not then have a black and white receiver. (Tr. 3757)

In addition to the testimony of experts such as Dr. Geer and Dr. Judd, we have, of course, the overwhelming approval of the public which viewed the field sequential color pictures. Especially significant is the fact that doctors who would be especially critical of color fidelity rated the CBS system very favorably. So far as the general public is concerned, in the first Walker Building tests over 70% rated the trueness to life of the color pictures as excellent or very good, 21% rated it good, 6.4% rated it only fair and .06% as poor. In the second Walker Building survey the results were even more favorable.

About the only evidence to the contrary are the same witnesses who have for ten years seen ghosts in the closet of the field sequential system and color television in general.

[fol. 250] Compatibility

We have on the scales two weights. On the one hand we have the field sequential system, presently adequate and with full potential for improvement. On the other balance we have the prospect of compatible color systems. These color systems presently are not yet even completely off the drawing board. RCA and CTI still do not know what will be in their field pickup camera equipment. Can we then gamble color for the American people in the next generation against the prospect of paper systems being developed into sound color systems?

No one has taken the position that if there is only one way to get color, via an incompatible system, we should stick to black and white. RCA and the industry's whole position on compatibility is based on the assumption that engineers may some day provide us with an adequate but yet compatible system. But to argue that compatibility is more important than color, when there is slight prospect of an adequate compatible color system, is to argue that existing black and white is better than non-compatible color when that is the only system which so far as we can see today will provide color for the American people immediately. But compatibility is not more important than color itself. Such was the testimony of an inventor in this field, Dr. Geer. (Tr. 3933) And such was the testimony of Dr. Engstrom in 1946: "My personal point of view is that compatibility is second to adequacy of performance, that performance must be met first." (Docket 7896, p. 1355) Exactly to the same effect was David B. Smith in 1946: "Well, speaking for myself, I think it [compatibility] plays quite an important part. It seems to me the first requirement is that the system work, but assuming you had two systems, both of which worked, then I would say the compatibility would be a very important factor in deciding which one you would use." (Docket 7896, p. 1388)

The Commission itself rejected the notion that color standards would be tied down by the concept of compatibility. It said:

> "This so-called principle of compatibility, it is urged, will encourage manufacturers of black and white equipment to proceed at full pace, will enable the public to buy receivers with confidence that they will not be rendered obsolete, and will not impede the development

of color television. The Commission is of the opinion that compatibility is an element to be considered, but that of greater importance, if a choice must be made, is the development of the best possible system, employing the narrowest possible band width, and which makes possible receivers capable of good performance at a reasonable price." (11 FCC 1535)

[fol. 251] Equipments

We have today but one possible color system that works. The quicker we finally adopt that system, the quicker the industry will develop the commercial equipments to get color to the American people.

The Commission has now had ten years experience with the development of apparatus by the industry for color television. So long as the Commission refuses to set standards for color television, just so long can we expect that the equipments which will make color television a reality for the American people will not be produced. As a matter of fact, the history has been replete with evidence that the radio manufacturing industry individually have not produced equipments unless they are applicable to an entire color system of their own. In other words, the only people who have made color equipment are proponents of specific systems. Those who have been proponents of systems that have competed with the field sequential color, once having been able to convince the Commission that there was promise in their system that might be developed later, have not worked upon the commercial development of the equipments that would make that system practical. The history of RCA's failure to develop commercial equipments for its simultaneous and dot sequential systems will be discussed more fully in subsequent sections.

On the other hand, the apparatus for field sequential color has been found by experience to be thoroughly practical. The field sequential system as proposed by CBS has utilized equipment in the medical demonstrations where the conditions of pickup were as adverse as those in remote pickup of regular commercial broadcasting. CBS medical studio equipment (the same utilized in the color field testing) has operated in many areas all over the United States and has shown color pictures to 100,000 doctors without a single

breakdown. Moreover, 16 medical conventions will use this field sequential system apparatus in the coming year.

The practicality of the field sequential system's apparatus is further demonstrated by the fact that that system is the only color system which is presently feasible for industrial purposes. Thus DuMont, which a short time ago announced an industrial color system, has incorporated almost in toto the color apparatus used by CBS. He testified that he chose the field sequential system for his own industrial color system because it was the fastest way to get a color industrial system.

What will be the apparatus situation if the Commission adopts standards for the field sequential system immediately? In the first place, color television, up through a 12-inch picture, would be available to the American public immediately. Existing black and white set owners would have the opportunity to convert these black and white sets so that they could receive pictures in color. Those potential set owners and existing set owners who did not desire to see field sequential color in color will be in a position to view these transmissions in black and white on receivers of any size that the industry may build. But more important than anything else is the fact that once standards have [fol. 252] been set, the television industry will then have the stimulus to develop one or more types of direct-view electronic tubes. And in addition, once standards are set, persons such as Dr. Lawrence, not directly connected with the radio or television industry, will have an immediate incentive to work on tubes that could be used in field sequential color.

Only if the Commission adopts standards for color now will American industry produce equipments to give the American public the full developed color system it deserves at the earliest date possible.

[fol. 253] II

In December 1946 hearings began on the petition of CBS to open up the UHF for its wide band field sequential color system. As in this (1949-50) proceeding, nearly the whole industry made known on the record its opinion that they were opposed to the adoption of the CBS system. As an alternative to the field sequential system there was suggested by RCA the simultaneous system. We know now

that this system could not possibly have been made the basis for a sound color service because it couldn't pass over the first hurdle of multipath and other propagation problems. On the record of this proceeding, it has been made clear that if the Commission had adopted the simultaneous system we could not have, today or ever, a color service. Thus, Mr. Plotkin asked Dr. DuMont:

> "Q. Had the Commission in 1947 adopted a simultaneous system of color transmissions, do you think there would be color today?
>
> "A. I rather doubt it." (Tr. pp. 9400-9401)

RCA admitted the complete failure of the simultaneous system.

> "Commissioner Jones: Well, I assume that you conducted field tests with reference to the simultaneous system.
>
> "The Witness: We conducted numerous tests in the laboratory but never got radio transmission because of our problems with regard to UHF propagation." (Engstrom, Tr. 2773)

In other words, despite all the claims by the industry of the great superiority of the simultaneous system over the field sequential system and despite the fact that RCA tried to broadcast signals of the simultaneous system, no radio transmission was ever obtained which produced satisfactory color pictures.

In view of the history of the simultaneous system, it becomes highly pertinent today to examine the 1946 testimony of those who now support the dot sequential system. RCA testified at great length concerning its then newly conceived simultaneous system. It is very significant that this testimony in its total effect did not merely lay before the Commission the possibility of a color system; rather, RCA expressly represented to the Commission that its simultaneous system *would be* a sound color system. [fol. 254] Dr. Jolliffe testified:

> "Further developments and improvements in television must and will be made. One of these developments will be a color television system which can become an integral part of television service. RCA has

developed the basic elements of an electronic simultaneous color television system which can be introduced, when it is ready in the future, without obsoleting the present excellent electronic monochrome system." (Docket 7896, p. 646)

RCA, of course, recognized that its system was then in the developmental stage and not yet ready for standardization. Dr. Jolliffe stated, however:

"The basic principles are established beyond question, although the engineering details are yet to be worked out. This will require some time, as Mr. Kell will explain, but the end result will be an excellent and practical system introduced without penalty to the existing service and without jeopardy to the investment of public and broadcasters in black-and-white television." (Docket 7896, p. 664)

Considering the fact that there was no broadcast experience or field tests to prove the point for RCA, Commissioner Jett secured as a substitute for such experience the following from Dr. Jolliffe when he asked:

"You could guarantee that?";

and Dr. Jolliffe replied,

"Yes, sir." (Docket 7896, p. 664)

Thus, we have here a guarantee by the head of the RCA Laboratories that the simultaneous system was certain to be developed into a satisfactory color system.

Dr. Kell testified for RCA as follows:

"Work on this simultaneous system using modern tubes and techniques has been carried to the point where all the basic factors have been studied, and the ultimate success of the system seems assured. From the work that we have done, we are convinced that the simultaneous system is basically superior to the sequential system of color television transmission . . . ." Docket 7896, p. 686)

[fol. 255] Thus, it is clear that in 1946 RCA represented without equivocation to the Commission that the simul-

taneous system was the best system by which the American public could get color television, that all its basic principles had been tested and the Commission could postpone the adoption of a national color television system until commercial equipment were developed for its utilization.

The present announcement of RCA of its dot sequential system as a reincarnation of the simultaneous system was launched on the proposition that its system was fully "developed". They tacitly represented to the Commission that their system was nearly ready for adoption as a broadcast service. Then at the hearing Dr. Engstrom testified:

> "Based first upon the principles of simultaneous color television which provide high performance and second upon the band saving features which still provide this high performance with a 6-mc channel, *we have* in the RCA color system the course that color television should continue to take to reach realization as a broadcast service. Our field tests, now beginning, will provide for us, the Commission and the radio industry the extensive data and the assurance through experience needed to crystallize the service. We shall press forward with the field tests to obtain this information as soon as possible so as to permit transition to a regular color television service. We welcome others to join in the observations and tests." (Tr. 2745-6) (Emphasis supplied)

Upon cross-examination, however, Dr. Engstrom hedged and admitted that the system was far behind RCA's representations to the Commission. Exactly as was the case in 1946, RCA now stated that only the fundamentals of its system -as been allegedly tested:

> "By Mr. Chapin:
>
> "Q. You are acquainted with the release, 'Comments of Radio Corporation of America', dated August 25, 1949?
>
> "A. Yes, I am.
>
> "The Witness: I wonder, Mr. Chairman, if it might not be better if I finished reading.
>
> "The Chairman: I think we will have the question.

"By Mr. Chapin:

"Q. I believe this was signed by C. B. Jolliffe for Radio Corporation of America?

[fol. 256] "A. That is correct.

"Q. The second paragraph of that document states:

'RCA has developed a new color television system which does not require any changes in present transmissions standards.'

How do you interpret the phrase 'has developed?' What does that mean to you?

"A. It means that we have conceived, analyzed, put together a system *which operates.*

"Q. As of that date you were entirely satisfied that you had developed a new color television system?

"A. That is right, and that we have tested it as to fundamentals, because this was all done, as you understand from what we have said, in the laboratory." (Engstrom, Tr. 2715-6) (Emphasis supplied)

It would appear that the CBS demonstration of its more fully developed system by actual on-the-air broadcasts forced RCA to brazenly palm off a dot sequential system which in its first demonstration could not even qualify as a color system. In short, they made their demonstration on October 10, 1949, well knowing that their color and the other characteristics of the system would not live up in any way to the representation made to the Commission.

In the 1946 proceeding we find that Du Mont had offered very favorable testimony in behalf of the RCA simultaneous system. Du Mont stated:

"On page 13, last pararaph, and Page 14, first paragraph, of 'The Truth about Color Television' it states:

'All electronic color television systems are now under development by several companies. These systems may allow transmission of color television, not in color sequence by fields, but in color sequence by picture elements, or by picture lines, or possibly even by simultaneous transmission of all three colors.

'We therefore believe that it is far too early to consider standardizing on a scanning system which

is an outgrowth of obsolete mechanical color filters, when electronic developments in color may make it [fol. 257] possible in a few years to provide excellent color television free from this fatiguing flicker and color breakup.'

The last few words of the first paragraph and the last paragraph quoted, of course refer to the simultaneous system recently demonstrated. Although we are in favor of the simultaneous system as demonstrated, projection tubes were used which cannot compare with the results obtained when the picture is viewed directly off the cathode-ray tube." (Docket 7896, p. 1425, 1426)

Dr. Goldsmith stated:

"We have done considerable work on simultaneous color television systems, as already discussed by Dr. Du Mont and illustrated in his exhibits. I would like to re-emphasize that a simultaneous color television system can be made to be compatible with the present commercial black and white standards. This point has been emphasized by a number of witnesses and I will not dwell upon it in detail. However, I feel strongly that they are on the right track.

"I feel that if the Commission feels in necessary to standardize some color system at the present time, it would be highly desirable to choose such a simultaneous system so that the inauguration of such a commercial system can follow smoothly from the present black and white television operations." (Docket 7896, p. 1468, 1469)

Dr. Goldsmith had a time table worked out, obviously on the basis of the simultaneous system. In it he agreed with the RMA conclusions. He stated:

"The proposed schedule for color television development, revised to date, is suggested as follows:

1) Expand black and white television service.
2) Develop color—two more years.
3) Set tentative color standards (one year).
4) Perform color field tests (one year).
5) Obtain FCC approval—one half year.

6) Provide color stations and receivers and establish full commercial service. (One year)

This indicates a period of five and a half years remaining before full commercial color television operation can be accomplished.

[fol. 258] "I might add that I was a party to the RMA deliberations on schedules and I agree 100 per cent with the findings. This is a recapitulation of the particular series of operations that we as a company might follow if we were going to go into this color business, and the schedule does not necessarily conflict with the RMA report. The RMA report is a sort of an industry composite plan to go into the color television business, and might move more rapidly in certain respects.

"Some of these things I have listed in sequential might operate to parallel and reduce it, but it is interesting to note that the five and a half years is not very far off from the ultimate commercial estimate of the RMA report.

"The final summary is about the same." (Docket 7896, pp. 1470, 1471)

Du Mont's position in the present proceeding with respect to the dot sequential system is somewhat unclear. At the beginning of the hearing befor the CBS system had been completely field tested, Du Mont in its written comments made a devastating attack on the RCA system as being so full of engineering defects that it would be impossible for it to materialize into a sound system. Later on in the hearing when it became obvious that the CBS system had at least a fair chance of standardization because of superior performance, the tenor of the Du Mont testimony changed from one of despair to one of hopefulness for the dot sequential system. His tesfimony was to the effect that he believed the problems in the dot sequential system could be worked out. He testified especially that such things as registration could be solved.

During the 1946 hearing Philco took a similar position. David B. Smith, testifying in behalf of Philco at the beginning of the hearing stated:

"However, we have not had an opportunity, nor do we believe that anyone else has as yet had sufficient

opportunity, to evaluate the requirements of the simultaneous system as compared with the sequential system from the receiver point of view, to determine at this time which one is preferable." (Docket 7896, p. 526)

However, by the end of the hearing, Philco and David B. Smith were convinced that the simultaneous system was the better of the two. Smith's testimony was as follows:

"In the third place, we do not believe that the sequential system is the most practical system of color television now available in the art. During this hearing demonstrations have been given of a 60-frame simultaneous system.

[fol. 259] "This system has none of the fundamental limitations of the proposed system. It will permit pictures as bright as those permitted by the present black and white standards and more than nine times brighter than the proposed standards.

"Moreover, it provides the most practical method of receiver construction to obtain such bright pictures."

* * * * * * *

"3. There is now available in the development stage a simultaneous system of color television which is clearly superior to the proposed sequential system in performance capabilities. This simultaneous system will provide the public with more television at less cost and will eleminate the problem of technical obsolescence, thus clearing the way for rapid expansion of the television industry. Development of the superior simultaneous system would be stopped if the proposed sequential standards are adopted." (Docket 7896, p. 1847, 1848, 1849)

Commissioner Hyde apparently had some question with respect to the reason for Smith's certainty with respect to the superiorty of the simultaneous system. The following appears in the record:

"Commissioner Hyde: Has anyone seen a demonstration of simultaneous television which had acceptable registration and acceptable brightness by which

to judge it as being superior to a demonstration which we have seen of a sequential system?

"The Witness: Well, I think that you should make your own judgment as to what you have actually seen.

"I will state to you, however, as an engineer that I am convinced, and I believe it would be agreed, that the cabilities of the simultaneous system are superior to those of the sequential system." (Docket 7896, p. 1851)

Philco's position in the current hearing has been somewhat similar to Du Mont's. It originally took the position that none of the color systems was ready. Later it argued that the dot sequential system is the one that shows the most promise.

It is almost something of a rude shock when one compares the unequivocal statements of RCA witnesses and others that the simultaneous system would become a sound system with the facts as we know them today. In evaluating this testimony we cannot, of course, be too critical merely because the engineers involved made a mistake with respect to the capabilities of the system. It must, however, be of great concern to the Commission that in giving this testimony these engineers did not merely stop with the assertion that this simultaneous system was a system that warranted further study. Rather the testimony in the 1946 hearing was:

[fol. 260] The simultaneous system could not fail of ultimate achievement and all that remained was the time to work out equipment devolopments. They categorically represented that development and field testing of equipments presented the sole time factor for a system superior to field sequential color. The significance of such testimony is almost obvious. It would tend to indicate to the Commission that there was in 1947 no risk in waiting for the future development of the simultaneous system rather than proceed with the adoption of the field sequential system.

The near recklessness of the testimony in the 1946 hearing becomes obvious when we become aware that the main difficulty with the simultaneous system propagation, especially the multipath propagation problem, was known to the whole industry. Although Dave Smith, testifying in behalf of the RTPB at the very start of the hearing, made clear that before the simultaneous system could be evaluated field tests were necessary with respect to the multi-

path problem (Docket 7896, p. 446), nevertheless, both he and the industry without such field tests made no reservations in recommending the simultaneous system in the final stages.

In view of Dr. Engstrom's testimony in this hearing, referred to above, that no successful radio broadcast was ever made with the simultaneous system solely because of this propagation problem, it is all the more startling to find that when the Chief Engineer of the Commission questioned Dr. George Beers in 1946 concerning the multipath problem, Dr. Beers brushed it aside as being equally applicable to the sequential and simultaneous systems. One significant thing stands out, however, in Dr. Beers' testimony on this point. He was not concerned that multipath affected the color fidelity of the simultaneous system while it did not affect in any way the color fidelity of the sequential system. This is but another indication of the very low weight which RCA, both in 1947 and in 1949 and 1950 gave to color fidelity. The following is the testimony:

"By Mr. Adair:

"Q. Mr. Beers, I wonder if you could give us any comments on the relative problems of multipath transmissions between the sequential and simultaneous systems?

"A. Well, I can give you some comments. They are only based on a limited analysis that I have given to the subject and on no experimentation at all. The effects will obviously be different.

"In the one case if you have a multipath effect, if it means an effect which results in a frequency discrimination, in other words, if you lose a certain band of frequencies in the spectrum that is being transmitted and received, in the case of a sequential system that result will be—assuming that that stays put with time—that result will be a loss in resolution in certain frequency portions of the picture, I mean in detail.

[fol. 261] "If certain frequencies are lost that will affect the resolution.

"In the case of a simultaneous system if a certain part of the frequency spectrum is lost it may change the color gradation in certain portions of the picture. It will have a different effect.

"But I would also like to say that if there are such effects and they are serious effects, which would not seem to be indicated by the testimony on propagation which has been given so far to the effect that with a high directive antenna you can minimize all these propagational vagaries, I think they would probably be equally serious in either instance. But if we don't have them we need not worry about them in any case." (Docket 7896, p. 770-771)

Solution of the propagation problem was a condition precedent to an engineer's ability to recommend the adoption of the simultaneous system to the Commission. History has proved that the propagation problem could not be solved and that for this reason the simultaneous system had to be thrown into the junk heap.[13] Yet more significant as far as final determination of this proceeding is concerned is the fact that the entire industry and its many eminent engineers who testified in 1946 and 1947 accepted the statements of Dr. Beers that what turned out to be an Achilles' heel of the simultaneous system was of minor consequence and really no technical problem at all.

Just as in 1947, RCA represented to the Commission that i-s system was sound even though its basic fundamentals had not been tested, so today RCA again represents to the Commission that its present system is sound although again its fundamentals are still but in a theoretical stage. Foremost among these theories of RCA is that with respect to the validity of the principle of mixed highs. RCA, of course, believes implicitly in the validity of its principle. In addition, on the record Donald Fink testified that the principle in general could be accepted. (Tr. p. 8091) On the other hand, both Dr. Baker of General Electric and David Smith of Philco either rejected or expressed grave doubt as to the validity of the principle. However, nobody other than the RCA testified that if the general principle were sound the appropriate cut-off for the application of the principle is 2 megacycles.[14]

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[13] It is recognized that portions of this junk heap were salvaged for black and white portions of the dot sequential system.

[14] As a matter of fact, Hazeltine in its demonstrations off the record to the Commission and in its written documents

[fol. 262] In view of this conflicting state of the record, it becomes of utmost importance to examine the testimony with respect to the principle of mixed highs more closely. This is especially true in view of the record and history with reference to multipath discussed heretofore.

At the outset, we must remember that the principle of mixed highs is not of recent origin. Dr. Kell in the 1946 hearing testified with respect to this problem. In his testimony he admitted that the use of mixed highs had the effect of reducing color fidelity. (Docket 7896, p. 737-741) In addition to the statement of the general mixed highs principle, Dr. Kell also testified with respect to the possibility of reducing the band width of the blue channel. (Docket 7896, p. 735-6)

During the demonstrations of the RCA system in 1947, questions were raised by Dr. Goldmark with respect to the soundness of the mixed highs principle, at least insofar as it used different bandwidths for the different colors. As a result of these question, Dr. Engstrom admitted that field tests were necessary and that they had not been completed. Dr. Engstrom said:

> "I do not think that the loss of detail in the high frequency end of the blue occurs- in any demensions, would bring about the effects that you have in mind.
>
> "On the other hand, I want again to emphasize that the simultaneous system may be operated with full band width in all of the channels, it may be operated with an attenuation of the blue band, and we at least believe that is proper; but we also appreciate that neither we nor anyone else has made all the tests that are necessary." (Docket 7896, p. 1163-4)

From the 1946-47 record, the ancestry of the mixed highs principle as presently conceived in the dot sequential sys-

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filed with the Commission indicated that if the principle of mixed highs is to be applied, it should not be applied with a 2 megacycle cut-off. Hazeltine conducted no field tests of live program material on a closed circuit nor did it field test its theorems by an actual on-the-air transmissions.

tem is made clear. Dr. Brown, during the current hearing, identified the mixed highs principle as follows:

"The principle of mixed highs, referred to previously, was described by RCA is Docket Nos. 7896 and 8976. It has been demonstrated that the mixed highs procedure is successful and satisfactory in a wide-band simultaneous system . . .

"I might review that for a moment. A few years ago Mr. Kell described, during the course of a hearing, the principle of mixed highs. I might try to outline it very briefly. That is simply this:

[fol. 263] "That the eye obtains a great deal of its color information in large areas, I should say not in small areas. That is, that the eye is not sensitive to color in fine detail. It sees in monochrome or essentially that. I think there could be a good deal of argument about just where you use the color and where you use mixed highs, but the result of a very large amount of work in the laboratories has led us to choose this figure of about 2 megacycles for our cutoff and our fringes and put all of our high frequencies together in what we call the mixed highs." (Tr. 2840-1)

Dr. Brown testified with respect to the possibility of reducing the band width of the blue channel in the dot sequential system. He stated that this, too, was based on theories explained during the 1946-47 hearing. He was questioned with respect to the basis for these theories:

"Commissioner Jones: Did you propose that publicly to anybody, that is, limiting the red and blue signals in band width as compared to the green signal which could be the full width?

"The Witness: Yes, to the Commission.

"Commissioner Jones: Did you have calculations on that basis?

"The Witness: Well, that business of mixed highs was done as a first of a series of physiological tests, external to the electrical circuits, in which many observations were made, and some observers to see that we, we were on the right track of seeing detail, monochromatic detail, on high frequencies, and once we had established a place where we thought that we

could cross over, take the mixed highs out and have color in this region and mixed highs here, we proceeded to design filters." (Tr. 7660-2)

Shortly after this testimony was given, he was again questioned with respect *of* the nature of the calculations that were made as the groundwork for the principle. He now stated that this was all the same as the work that was done in 1946.

"Commissioner Jones: What I am getting at is, there must have been calculations where you got right down to brass tacks on figuring out these formulae as to whether you would have a tenth of a megacycle for red, blue and green, or whether you would have something else, and the balance of it in black and white, and the mixed highs.

"The Witness: Well, but we had already decided back in 1946, that had nothing to do with this sampling principle, as such. That was in our simultaneous system. We had already made up our minds that we were going to take up to about 2 megacycles, and that we would have a really good color, and supply the fine detail with the mixed highs." (Brown, Tr. p. 7665)

[fol. 264] To sum up we find RCA relying exclusively on its 1946 experience for the validity of the mixed highs principle—a principle which is most basic to both the 1946-47 simultaneous and the 1949-50 dot sequential systems. Taking both records together, we find no description in detail of any tests that may have been conducted to establish the soundness of the principle. Taking both records together, we may only ascertain that the principle had been tested roughly in 1946 (Kell, Docket 7896, pp. 737-741) and that these tests apparently were *psychological* (Brown, Tr. 7660-7662). No tests apparently were made with respect to the dot sequential system's use of the mixed highs principle. So far as both records are concerned, we don't know the nature of any tests, how many subjects were used, whether the tests included radio transmission of subject matter, whether only the ability to see detail in color was tested or whether color fidelity and contrast effects were also studied. So for as the record in both 1946 and at present are concerned, the principle of mixed highs is a matter of complete theory, unsupported

by an- scientific data other than bare-faced statements by RCA witnesses and Donald Fink.

From the record it appears that the quality of the RCA dot sequential color picture is probably impaired because of the use of mixed highs. RCA, however, despite the absence in the record of detailed field tests or any other kind of adequate *psych*ological tests, refuses to recognize any doubt with respect to this principle. Upon questioning Dr. Brown, the following colloquy appears:

> "Q. In all your observations you have made on your mixed high system over-all, you don't feel that there is any problem at all of apparent loss in contrast when the mixed highs are used?
>
> "A. Mr. Chapin, I am, I think, as thoroughly convinced of the complete adequacy of the principle of mixed highs as, I think, anyone in the RCA organization." (Brown, Tr. p. 8502)

The question flares up and hits us in the face, "Why hasn't RCA in the period since the conception of the simultaneous system provided the Commission with an adequate basis for the validity of the principle of mixed highs?" Even assuming that it wished to kill color television by doing nothing from the period between the Commission's decision in 1947 and the institution of the current proceeding, it still has had a full year to conduct tests to establish the validity of the principle. So far as the record is concerned, would we be justified in assuming that some such tests have been conducted, since this principle goes to the heart of the system, and that the results of these tests have not been communicated to the Commission? Or can we assume that, as in the case of the multipath problem, RCA is really not concerned whether or not its color system will work so long as it offers the Commission another color "utopia" to prevent the adoption of the only sufficiently developed color system, the field sequential system? In either event, we are faced with the conclusion that so far as the principle [fol. 265] of mixed highs is concerned, there is something wrong in Denmark. Since the mixed highs principle was used in the 1946-47 hearings, un-field-tested, and again in the 1949-50 hearings un-field-tested, so far as the record is concerned on both occasions, we have no justification whatsoever for relying upon the prospective soundness or validity of the mixed highs principle.

In addition to problems of color fidelity in the RCA color system, caused by the use of the principle of mixed highs, the technique of color selection by dots also produces color degradation as a result of crosstalk. Crosstalk is caused by the signals from one color leaking over into the signals of another color. It is, on other words, the intermixture of dots of one color with dots of another. From the record it is clear that the problem of crosstalk is very important.

We have in fact on the record uncontroverted testimony that because of the problem of crosstalk, upon presentation of the keyboard pattern during the Laurel demonstration the RCA picture suffered from color contamination. This testimony, never rebutted by RCA, is as follows:

> "What further can happen colorwise is the cross-talk mentioned by RCA and which I was aware of earlier, due to the sample frequency relationship to the frequency transmitter.
>
> "It was stated by RCA that theoretically, I think, somewhere between .5 megacycles and 2 megacycles they can have cross-talk that causes mixed highs to be lost. We are below the limit of their mixed highs. And that cross-talk has shown up in their picture particularly on small color detail—not so small detail, rather.
>
> "You remember the Laurel demonstration with the keyboard—we will call it a keyboard chart. When that keyboard chart was vertical the alternate colors, the red, blue and green washed out, deteriorated in color. Not until it was large detail did they show up anywhere in some sort of fidelity, but the fidelity becomes tremendously bad. Only on the field sequential receivers did the colors maintain their purity to the end, or as far as they were resolved.
>
> "Now that is an effect of this color contamination I mentioned." (Goldmark, Tr. 9268-9269)

Despite the seriousness of crosstalk, when RCA first presented its case in the current proceeding, it brushed off this problem. Dr. Brown testified:

> "Likewise, the red and blue samples are each taken at points on the composite signal where no crosstalk is contributed from the other two color signals.
>
> [fol. 266] "The above statement concerning absence

of crosstalk holds good for all frequency components up to one-half the sampling frequency. For frequency components approaching the sampling frequency in order of magnitude, from a purely circuit aspect, crosstalk is present. However, the physiological characteristics of the eye which make possible the application of the mixed-highs principle apply equally well to the crosstalk of the higher-frequency components. Consequently, crosstalk in the fine detail is of no consequence." (Tr. 2875)

As the hearing progressed and the problem was aired, Dr. Brown gave more and more attention to the problem of crosstalk. In connection with his extensive presentation with respect to the theoretical nature of the sampling process in the dot sequential system, he now gave extensive treatment to the problem of crosstalk. Examination of this testimony indicates again that there was no concrete resolution but a minimization of the problem by the statement that it could be solved. We are here left again in the position of having to rely on unverified theory—theory that could have been proven by adequate field testing. Thus Dr. Brown stated:

"Later in the report we have shown circuit details of developments which completely eliminate this crosstalk."

Miss Hennock interrupted to ask:

"Well, do you have these developments now?"

Dr. Brown's reply:

"We are working on some of them; well, all of these that are in here, we are working on, and have done some work on, yes."

The full testimony on this point is as follows:

"The Witness: I have, for instance, just mentioned this color cross-talk at this point. Later in the report we have shown circuit details of developments which completely eliminate this cross-talk.

"Commissioner Hennock: Well, do you have those developments now?"

"The Witness: We are working on some of them; well, all of these that are in here, we are working on, and have done some work on, yes.

"Commissioner Hennock: Well, you have not perfected them?

"The Witness: Well, yes, I think so.

[fol. 267] "I might point out one as one example: This matter of color cross-talk, we have found that it is very difficult to evaluate by paper analysis what the cross-talk is, how serious it is to the eye.

"We have produced rather serious pictures with this quantity of 50 percent cross-talk, which mathematicians can uncover.

"In a paper which was passed out here at the hearing, but not offered as an exhibit by Philco, and published in "Electronics" Mr. Boothroyd chose 33⅓ percent cross-talk in our color system, and drops it there.

"I am sure that we have been conscious of that for a long time, and we have taken these steps to eliminate it, if necessary, and we have tried to evaluate it.

"We have built up *equipment which we are going to experiment with* to see whether there is a real material improvement when we put it in.

"Commissioner Hennock: I am just trying to find out where this testimony fits in. I am not sure whether I will be able to evaluate it properly. I do not expect to be able to. I just want to know what you are trying to prove, and what you are discussing, how it fits into the whole picture of your system.

"The Witness: This is, I believe, the first complete engineering analysis of our system that has been presented in the hearings, and I think that it covers just about every aspect of it.

"Commissioner Hennock: You discuss the defects and also the——

"The Witness: Possible defects, possible defects, or should I say defects which, at least, appear there on paper, and we are trying to evaluate them, and the mixed high, particularly, I think, has been questioned in this hearing. It has been misunderstood, and it has not been fully explained." (Tr. 7650-7651) (Emphasis supplied)

A few minutes later, Dr. Brown, who just said RCA was going to experiment, is talking of how RCA already has the means to eliminate crosstalk:

> "Commissioner Hennock: Well, frankly, I did not expect to understand you, as an engineer, but I just wondered where it would fit in here. What does this mean in the case? What do you want us to interpret by your testimony? Where does it fit in here? What are you trying to prove, in other words?
>
> [fol. 268] "The Witness: I am trying to show the steps that we can take to get rid of cross-talk, if it is necessary, for one thing.
>
> "Mr. Jensen, a week ago, and I think at the IRE, in his statement said that up to—I don't remember the exact figure—up to a megacycle we have purity of color; above that we have cross-talk.
>
> "I want to show that we have taken the steps and have means that if that cross-talk is serious we have the means of completely eliminating it.
>
> "I think that as to the matter of being able to reproduce the very high frequency components of the picture up in the neighborhood of 4 megacycles, by a sample dot interlace system, I want to show that even though the sampling frequency may be 3.6 or may be 2.6, if you will, that we can still reproduce frequencies up at 4 megacycles.
>
> "I might take a peep at my conclusions and see whether or not I am going to come out with that answer.
>
> "(Laughter.)" (Tr. 7656)

This is but another example how RCA brushes off serious problems un-field-tested rather than discussing them frankly in the record.

Just as in the case of mixed highs, the present state of the record with respect to this fundamental problem is completely conflicting. RCA claims 50% crosstalk between color signals, Dr. Boothroyd of Philco claims 33⅓%. Whatever is the extent of crosstalk, we may be almost positive that it degrades the color fidelity of the RCA system.

We have just completed a discussion of both the mixed highs principle and the crosstalk problem. Both of these

problems affect color fidelity of the RCA picture. While in the first demonstration October 10, 1949, of the RCA system, they showed practically no color pictures, the only improvement that has been made so far, according to this record, is some stability in the color reproduced by reason of the burst on the backporch of the synchronizing signal However, once the colors have been made stable, the RCA picture is still but a degraded color picture. The problem is particularly critical in the small areas of the picture, like lips, which never appear in natural color. It is also apparent in large areas on live pickup, when the movements of the body of the characters televised throw different shades of light or intensity of light upon the skin. On live pickup as the characters move around, as they naturally will in regular commercial broadcasting, once the head is nodded, the skin changes from a light tint to dark and unnatural grays or purplish hues.

In summary, upon examination of RCA color pictures (on the triphosphor tube or on the 3-tube receiving sets) it [fol. 269] may be observed upon close viewing that in the light tone color areas such as skin tones, there is a black crosshatching. There is also a color degradation in small areas which is visible at any viewing distance. Whether the degradation of color in the large areas particularly predominant in skintones during live programs is due to black and white crosshatching (mixed highs) or to contamination of one color signal by another (crosstalk) has not been determined. Color fidelity is degraded by both the use of mixed highs and the presence of crosstalk; nevertheless, the use of mixed highs and the selection of color by dots is claimed as an advantage of the RCA system. Even if RCA solves the problems created by crosstalk, the mixed high principle leaves the RCA system with a permanent form of color degradation. The theory that RCA has followed—that fine detail is not seen in color—their reliance on black and white crosshatching appears to tie their system permanently to degraded color in light tone areas, such as skintones, and in small areas, such as lips.[15]

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[15] Dr. Judd testified that in general the RCA system has had inferior color pictures as compared with CBS. He stated that on occasion RCA came up to the level of CBS. He further stated that on such occasion it was necessary

[fol. 270] III

It is RCA's position that all of the difficulties with the dot sequential system are merely problems of apparatus design. Since the studio equipment including the camera are basically the same as that used in 1946, it is appropriate to examine the 1946 record to determine the state of development of this equipment at that time.

In 1946 Dr. Kell said:

> "Cameras and transmitters for the simultaneous system are now being constructed. The camera being built will be suitable for both studio and outdoor use.
>
> "The transmitter will be completed and radio transmission with the simultaneous system will be started very soon.
>
> "A camera for the simultaneous system is now being constructed. The camera will be suitable for both studio and outdoor use." (Docket 7896, p. 696)

Much of the testimony in the present record has dealt with the apparatus problems which center around the RCA three-tube camera. Many of the witnesses explained that because the RCA tube camera is a three-tube camera it is subject to severe registration problems which have not as yet been conquered. It is believed that we all can agree that the registration problem at the camera must be solved if the dot sequential system is to become satisfactory. This is borne out on the record by the testimony of Dr. T. T. Goldsmith who upon cross-examination in the latter part of the hearing said:

> "Q: Will you please give to each of the systems, as I go down—will you indicate to me what you regard as the strong points and weak points of each of the systems? Suppose we start with RCA. First the element of registration.
>
> "A. The RCA color television system still has considerable doubt as to the registration problems being licked for commercial work.

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for Dr. Epstein, one of RCA's leading engineers, to be in attendance to adjust the RCA receiver. CBS in its brief raises the question of what kind of subject matter was televised during these tests.

"The RCA cameras as presently demonstrated yet is a triple optical head, *and there a very serious registration problem remains.*

"We believe there are developments in the mill which can overcome that particular registration problem, but we feel before it would be adopted commercially it should at least be experimented with to the extent of building practical working models to prove out the feasibility of such registration relief." (Goldsmith, Tr. p. 9921) (emphasis supplied)

[fol.271] The existence today of a registration problem in the RCA camera is all the more aggravated by the fact that RCA has testified and we know that the dot sequential system utilizes the same studio equipment as the simultaneous system utilized. Dr. Engstrom testified as follows:

"The color studio apparatus which we have installed in station WNBW at the Wardman Park Hotel in Washington and which will be used for demonstration during this proceeding will also be used for field testing on the RCA color system. This studio apparatus is 'simultaneous color' apparatus and has resulted from our work on the simultaneous system." (Tr. pp. 2677-2678)

Upon being pressed for improvements in the camera since 1946, Dr. Brown testified:

"Commissioner Jones: The thing that caused the question is that the color camera apparatus is the——

"The Witness: The same components used in the wide-band simultaneous system.

"Commissioner Jones: Yes, but it is different. You explained these modifications. I wanted to get the detail.

"The Witness: Yes, sir, that is right, the same components. Well, in our wide-band simultaneous system we use the dichroic mirrors, use the three tubes, you see, but we have learned better techniques. The tubes have been improved just as black and white camera tubes have been improved in the last three years. So I would not want to say it was the same color camera, you see. It is one using the same principles but using the improved tubes as they have come along, and im-

proved techniques on amplifiers and other circuits of the camera, just as they have been improved also in our commercial black and white cameras." (Brown, Tr. pp. 2816-2817).

But just as the camera is basically unchanged, so is RCA's attitude toward misregistration. Thus Dr. Engstrom testified as late as February 27, 1950, that registration at the camera was no problem:

"Item 29. Performance as to geometric scanning registry at receiver and pickup, both electrical and optical.

"The studio cameras which we now use in our color field tests are research models and do not include convenient flexibility for lens change and aperture control. We have evolved set-up routines, including scanning optical registry, which are effective in placing the cameras into operation. This we do with regular [fol. 272] studio personnel trained for black and white television operation but now having experience gained during our color field tests. The new field camera has a single lens for all three camera tubes, providing easy lens change and aperture control. We expect that a single lens will simplify the registry procedure.

"While registry adds steps to a set-up routine, *we have accomplished good registry in our studio performance. We believe that camera registry is practical for the RCA color television system, and are certain that it is not a limitation to the establishment of the system.* In our field tests we now have had over 1,000 studio camera hours of operation since early September, 1949.

"Mr. Salant: Mr. Chairman, may I ask a question there?

"Dr. Engstrom, could you tell me how many of those thousand studio hours were with live cameras, or were they all?

"The Witness: This is all live cameras; that is the number of hours that the cameras have been in operation.

"Mr. Salant: That excludes the hours in which you have used the flying spot?

"The Witness: Yes, it does; it excludes it.

"Mr. Salant: Yes.

"The Witness: The receivers which we have demonstrated to date have been of two types in so far as matters pertaining to registry are concerned. The first of these is the projection type where the three color images are projected simultaneously upon a single viewing screen. The other is the direct-view type wherein the images on the three picture tubes are viewed simultaneously through dichroic reflectors as a single image. Each of these arrangements involves matters of optical and electrical registry.

"In none of this work have we experienced any fundamental difficulty in obtaining proper optical registry of color images. Electrical registration achieved in these arrangements has been satisfactory and give no indication of being a system limitation. We are now convinced that these matters are fundamentally feasible and practical. Their satisfactory attainment involves no more than normal apparatus considerations." (Tr. pp. 6102-6103) (emphasis supplied).

[fol. 273] More important yet is the fact that just as in 1946, so in 1949-50 RCA did not explain how it could develop the 3-tube camera which causes the misregistration into a one-tube camera and yet retain mixed highs, an essential element of its system. For mixed highs require a simultaneous camera while only a one-tube camera is required for the sequential system of color TV.

We must therefore come to the conclusion that it is extremely doubtful whether RCA, which has had five years to lick the problem, will ever lick it. Dr. Goldsmith says it is today still very serious.

Another problem which RCA cannot seem to conquer is construction of outdoor pickup equipment. This problem is, of course, related to the registration problem in the camera. The permissible tolerances are so critical that completely stationary equipment is all that has been built up to this time.

But back in 1946 Mr. Kell, as we have pointed out, said outdoor pickup was then being built. None, of course, was offered in the 1946 hearing. On September 30, 1949—four

years later—Dr. Engstrom announced RCA was still building this equipment:

> "We have started development of a field type color camera and associated apparatus. This we expect will be ready next spring and will then be added to the field test set-up. This field camera will use a new camera tube which will greatly reduce the size of the camera itself. A mock-up of this camera and an operating sample of the camera tube will be available for display during our demonstration on October 10." (Tr. p. 2718)

And the same day he announced this equipment would be field tested:

> "We then will move receivers into the area, will test them, will move them around, we will establish programming tests, so that we learn how to produce programs for color, what the flexibility is in producing programs for color, and then, as I indicated earlier in my testimony, we will move into the area, when completed, field type equipment, so that we may go outdoors and try programming from outdoor scenes." (Tr. p. 2747)

Dr. Brown in his testimony in the beginning of the hearing minimized the problem RCA has had to face in this regard.

> "Commissioner Jones: Yes, sir. It seems relatively simple, but the reason I ask, I understand you did not have any outside camera equipment, and I wondered whether the difficulty was the size or what.
>
> [fol. 274] "The Witness: No, sir. The camera itself. You see, you know the engineers will begin working with this thing, and it is the language you have to check us up on.
>
> "The camera itself is not the problem as far as outside equipment, the other things. The signal coming out of the cameras has been amplified. You have to have synchronizing generators, you seek, and we have equipment that represents the terminal equipment that is put in a fixed position in the television studio. And then you have to develop and construct a suitcase equipment to take out with the camera to accompany

the camera—the synchronizing generators, the circuits, and power supplies, and all of those things that give you deflection in these camera tubes." (Tr. p. 2815)

But a moment later Dr. Brown confessed to the true state of the situation; he didn't even know what would be inside the field pickup.

"Commissioner Jones: I am sorry. I will try to say again what I had in mind. I did not mean to infer you use the same outright physical equipment you used in the simultaneous system. What I was trying to do was to get the picture so those presently broadcasting black and white in all of its problems, remote pickup, studio programs, and chain programs, and so forth, just what changes now to adopt your system would have to be made, and what the problems are: How big the equipment is; what weight it has; and so forth.

"Could you embellish it that way?

"The Witness: Heavens, no. I wouldn't have the faintest idea how to tell how big it is and how heavy it is going to be, and that sort of thing, because I don't regard this outside pickup camera as a research program. It is a matter of having time to do these things, to get them built.

"And if we had thought—well, if your notice of hearing had been out three months sooner, maybe we would have had it. I don't know. You just can't do everything in the laboratory, and we chose to do the things in preparation for our demon trations that we though- would be significant. And I know that I myself did not feel that to prove the principles of the system we would be called to have remote pickup equipment.

"Now, of course, if we are going to try to prove that, that we have got a system, got the stuff on the shelf, if we have to demonstrate a remote camera—and we will have it and expect to have it early in the spring." (Tr. pp. 2817-2818)

[fol. 275] But February, 1950 came and still the outdoor pickup was in the laboratory. However, there were signs

that it was coming along and the problem was now getting easier. Dr. Engstrom testified:

"Portable Field Pick-Up Equipment:

"In our progress report of December 30, 1949, to the Commission, we indicated progress in the development of portable camera equipment which might be used for remote color pick-ups.

"At the time of our October 10, 1949, demonstration we showed a sample of a small pick-up tube, which we have called the Vidicon, and mock-up of a small field camera. This mock-up represented a goal toward which we are directing our efforts on portable color field pick-up equipment. However, at the present stage of development, it seems best to use standard components and circuits and to make provision for a lens-turret and an electronic view finder. Accordingly, the field camera which we now have completed is housed in an ordinary black-and-white field camera case. The compression in size of this extent is made possible by using three Vidicon tubes similar to the one shown on October 10th.

"Electrical testing of the circuits of this camera, and associated apparatus is underway. When tested, this field camera will first be used in Princeton in color vs. color tests in connection with our studies of co-channel and adjacent-channel interference on the RCA color system. Upon the completion of these measurements we shall use the field camera in New York to furnish a color signal for WNBT, New York. We shall then take field measurements on interference between WNBT, New York and WNBW, Washington, both on Channel 4 and each using an RCA system color signal.

"Following these field tests, we plan to bring the field camera chain to Washington for use in our color television field test.

"Field Test Activities:—

"The Chairman: Mr. Engstrom, at what date do you expect to conduct these co-channel and adjacent-channel tests?

"The Witness: We are hoping to do that during the month of March. I believe within about a week we hope to get the work started.

"The Chairman: Go ahead.

[fol. 276] "Commissioner Jones: Is this a necessary component to the successful operation of your system?

"The Witness: You mean a field——

"Commissioner Jones: The camera, the field camera, and so forth?

"The Witness: We did not feel so in the first place, Commissioner, because there is nothing about this system which is limiting for the kind of camera we use; only that the cameras we built first were suitable for indoor use, first, and tied by cables to a control room in the studio; but obviously we will want to make observations with field cameras.

"Commissioner Jones: What I am trying to get at is if you do not develop this camera to your satisfaction, and you just have the conventional cameras, you do not recommend holding up the adoption of standards on your system because of the failure of the development as your expected of the new camera?

"The Witness: No, but we don't expect failure." (Tr. pp. 6034-6036)

However, as late as May 9, 1950, when the record was about to be closed RCA not only had not field tested an outdoor pickup but had introduced nothing into the record on this score. RCA did make an estimate of the cost of such equipment, it said (Exhibit 378A):

> "In respect of field cameras, it is believed the cost will be approximately the same as for studio cameras, subject to the same potential reductions in cost."

No further information with respect to field cameras was supplied. CBS objected to the introduction of this cost estimate. The record is as follows:

> "Mr. Salant: Then I do have one other question.
>
> "The second paragraph of 378-A, I think, is objectionable simply because nobody has any basis for making a judgment of its accuracy.
>
> "We have not seen a field camera; we do not know what goes on inside or outside of it, and we have this

bare statement, that a field camera, of course, is necessary for the operation of a station; but we have no more than this second paragraph; I do not think it is enough.

[fol. 277] "Mr. Heffernan: Well, in respect to that, Mr. Chairman, it is an estimate given by RCA of the price at which apparatus would sell, and at this stage of the art, we submit that that is perfectly reasonable and normal to do. It does not differ in principle from other estimates given here throughout the case.

"Mr. Salant: In the case of estimates for other pieces of equipment, one has seen them and one knows what is inside them; one knows how they work. The field camera, so far as the record is concerned, is a complete unknown.

"The Chairman: I think with the discussion that there has been about it, we will let it stay in." (Tr. pp. 11016-11017)

Nothing further with respect to field equipment was introduced by RCA during the remainder of the hearing.

Because of its critical nature grave problems exist with respect to the development of a field camera for the RCA system. It is to be noted that the evidence of a satisfactory field camera is of essential importance to any color system. Commissioner Sterling expressly asked Donald Fink whether the Commission could gamble with a system that had a satisfactory indoor pickup but had not as yet developed an outdoor pickup. Mr. Fink answered that the Commission could not take a chance with such a system because an outdoor pickup was essential. (Tr. p. 2142). It will further be recalled that during the 1946 hearing much ado was made with respect to the failure of CBS to demonstrate the outdoor pickup that it claimed it had built. The Commission referred to the failure to demonstrate this equipment in its 1947 color decision.

It is of the utmost importance to recognize that this very same camera with all the attendant problems described above is exactly the same camera borrowed from the RCA simultaneous system. In other words, if RCA has been working on its outdoor pickup for five years, an assumption that it can't put together anything good enough to show the Commission is justified. If it has not been working on this problem to improve registration, there is little

likelihood that it is interested in color TV with good registration.

Dr. Engstrom testified that registration was not a system problem but one of apparatus design. In his opinion it was licked in 1946. He said:

> "Our analysis, and the review, continued, and those systems which looked as if they might remove the limitations we found in our sequential setup, all required the registration of more than one image at the receiver.
>
> [fol. 278] "We moved in this direction with some hesitation, because a number of years ago we set up that sort of a system; but our tools were not sharp enough; we did not do the job to our satisfaction.
>
> "However, since our analysis indicated that we might move on that road now, we made those tests to determine what our problems would be, and we learned that as a result of the things we had done during that interval of five or six years, we had improved the situation to the extent that the problems were less severe; they are of such a character that they can come within the scope of practical design limitations. So, we then moved in the direction of thinking about the complete system." (Docket 7896, p. 1130)

However, at the demonstrations in 1946, Dr. Goldmark saw misregistration:

> "Dr. Goldmark: I would like for the members of the Commission to step up and observe—I would like to point out quite serious color fringing, which may be partly electrical. I would like to point out the color fringes which apparently are partly electrical, and due to electrical lack of registration and partly due to lack of geometrical registration on both receivers, both color receivers." (Docket 7896, p. 1217)

And so did Mr. Plotkin:

> "Mr. Plotkin: Mr. Engstrom, I noticed that some of the film sequences that along the edges of some of the figures there seemed to be some green color. Was that the color mixture or was it maybe a green ghost or what?" (Docket 7896, p. 1147)

Dr. Engstrom's comment in reply to Mr. Plotkin's observation was typical of RCA's attitude toward misregistration in 1946 and in 1949-to-:

> "The Witness: I think that is just one of the problems we have left ahead of us.
>
> "I am going to say, and at the same time ask for verification from Mr. Kell—I am sure that what you saw was not misregistration, but lack of ability so far to handle all the little niceties of this color situation. Is that correct, Mr. Kell?
>
> "Mr. Kell: That is right; and I think that we can see that a little more clearly when we get some stationary slides that will stay put and we can get-up and look at them carefully." (Docket 7896, p. 1147)[16]

[fol. 279] If it be claimed that the misregistration was due in part to the receiver problem, we must consider the testimony of Mr. Kell that receiver misregistration probably would not be objectionable. He said:

> "The registration requirements are similar to those existing in color printing and some kinds of color photography. Ideally, the three rasters should be identical and properly positioned within a fraction of the width of a scanning line. Practically, a considerable amount of misregistration may be present without being objectionable." (Docket 7896, p. 703)

A little later Mr. Kell testified further with respect to registration in the receiver:

> "Six, Image registration: In the sequential system there is a registration problem of the three color images caused by regulation of the voltage supply for the kinescope.
>
> "In the simultaneous system the problem of initially registering the three color images on the screen is substantial.
>
> "However, by using a single vertical and a single horizontal deflecting circuit for the three kinescopes,

[16] It is to be noted that Mr. Kell felt there would be less misregistration when the subject matter was being televised by a flying spot scanner.

the problem has been proven to be less difficult than was expected.

"Even with the first developmental kinescopes and deflecting yokes, good registration has already been obtained.

"With mass production of components by machines and jigs where uniformity occurs naturally, excellent registration will be obtained and maintained without serious difficulty; based on our experience that we have had, we have no question of the practicability of registering the three images." (Docket 7896, p. 726)

From the demonstrations in this hearing it is of course clear that in 1950 RCA had still not solved the registration problem in a three-tube receiver. And whatever may be the effect of the tricolor tube on the receiver registration problem in the RCA system, RCA in 1950 still has the same camera problems it had in 1946.

[fol. 280] IV

In evaluating the engineering representations made during this hearing, the Commission must recognize the motives which may possibly lie behind them. Examination of the record of the hearing on color in 1946-47 makes clear what we mean. In 1946 RCA admittedly brought out of its laboratories a simultaneous color system because its prime competitor, CBS, proposed a color system which involved opening up the UHF. While it claimed the system had been tested so far as the basic principles were involved, it admitted that the details of apparatus still had to be worked out. RCA must have recognized that merely holding out the hope of a simultaneous system would not be enough to stop color in 1947. Therefore, RCA, together with the organized industry (RMA and its members), offered the Commission a concrete time table which it was claimed would bring color to the American people via a fully developed commercial simultaneous system by the middle of 1951 at the latest. In addition, it was claimed that color would be started much before this. It was stated that 18 months from the time of the Commission's decision rejecting the CBS proposal, standards for the simultaneous system would already have been set. It was stated that within 12 months from the Commission's decision denying

the CBS petition, full field testing would be in operation with two transmitters. The testimony, which attempted to lay a picture of reality behind the simultaneous paper system, was given by Dr. Engstrom as a witness for the RMA. He said:

"The third question before Committee 2: How long will it take to establish basic standards for such a compatible system, and to develop that system to provide a broadcasting service comparable with the present black-and-white service?" (Docket 7896, pp. 1324-1325)

"The Committee took as the basis for the estimates in answer to Question 3 the assumption that the present FCC hearing would close without the establishment of any standards for color television. It was also assumed that work would then proceed expeditiously on the development and field testing of the simultaneous system leading to industry agreement on standards and then to production of apparatus.

"A review of the opinions of those present indicated that field testing could start in six months, and be in full-scale operation in 12 months with two or more field-test transmitters.

"Field testing would then continue actively until standards are agreed upon and then taper off until start of production and commercial programs.

"This review also indicated that the consideration of standards could start immediately upon a decision from this hearing, with agreement to be expected in 18 months.

"The estimates of time assume that development work would continue from zero year—zero year being the time the decision to establish no standards is reached at this hearing—until agreement on standards [fol. 281] is reached 18 months from zero year. The slant line of the charts to which we will refer later for each item of the simultaneous system is intended to indicate this. The estimates further assume that until standards are agreed upon orders will not be placed for apparatus and commercial licenses will not be issued to broadcasters. (In the estimates for the sequential system this time for the establishment of standards is zero year and for the simultaneous sys-

tem, zero year plus 18 months.)" (Docket 7896, pp. 1328-1329)

Since this testimony was given in behalf of RMA, the Chairman put questions to Dr. Engstrom as an RCA witness. This testimony established the agreement of RCA with the statements of Dr. Engstrom as an RMA witness.

"I think perhaps it might be easier for you to answer from the standpoint of your own company.

"Your own company, as indicated, would have a simultaneous receiver ready for retail sales six months later than it could have a sequential system ready; is that right?

"The Witness: Yes.

"The Chairman: You start a year and a half later, so somewhere along the line you pick up a year.

"The Witness: I think, Mr. Chairman, that the process which I shall describe is probably one of the reasons why some of these charts come out the way they do.

"We do not in fact, speaking now of the RCA estimates, start a year and a half later, because all during this period up to the time that standards might be agreed upon we will be in the process of developing radio circuits, the intermediate frequency circuits, and many of the components of the receiver.

"We, I think in common with some others, *do not today have satisfactory designs for the head end of a receiver*, either *as to certainty of stability* and *certainly not as to avoiding oscillator radiation.*

"On the estimates which are indicated here, *all but one manufacturer took into account doing the things that will be determined necessary to reduce oscillator radiation* of a satisfactorily low level, and it is those things which take time, so there is little loss during that particular period when standards might be in the process of determination for the simultaneous system." (Docket 7896, p. 1333) (emphasis supplied)

It must be remembered at this point that CBS had substantially field tested its system and had proposed standards for immediate adoption. RCA in the earlier stages of the hearing was making no distinction between equipment

[fol. 282] development problems and the Commission's duty of setting standards for commercial operation of color broadcasting. It is obvious that since Columbia *and* proposed standards for its system that RCA's efforts were to show that even if the Commission waited 18 months the adoption of standards for the simultaneous system, there would be no time lost for the initiation of color broadcasting because the time for development of commercial equipments far outdistanced the time required for the Commission to set standards. Dr. Engstrom, in drawing this distinction, testified as follows:

"The Chairman: I think I understand, but let me try once more.

"*Taking just the simultaneous receiver, there is a certain amount of work that has to be done before you can get a simultaneous receiver ready to sell.*

"The Witness: Yes.

"The Chairman: Now, let us say that is, according to your estimate, a 3½ year period.

"Now, standards could come at any point along that line. If standards come now for the simultaneous receiver you would still have 3½ years' work. If standards come a year from now, you would still have 3½ years' work; is that right?

"The Witness: I think that is a theoretical case, yes; but if we could have standards today on the simultaneous system, then it is not likely that it would take all of the 3½ years, because in order to decide upon standards, we must have decided upon some of the components in some of the designs.

"The Chairman: That is what I am trying to get at. That element in included?

"The Witness: That element is included, and the production time I suppose in all of these estimates—that is, the time between the issuance of drawings in the factory and the first delivery of apparatus—is in all cases probably much less than the indicated time here, being in the order of probably a year or possibly 18 months and the additional time of the estimates of preparation to be in a position to issue designs to the factories for production." (Docket 7896, pp. 1334-1335) (emphasis supplied)

Dr. Engstrom upon cross-examination re-emphasized all of the work that would be done on the simultaneous system if the Commission did not make an immediate decision on the field sequential color system.

[fol. 283] "By Mr. Brauner:

"Q. Mr. Engstrom, how was the figure of 18 months for the establishment of standards for the simultaneous system developed? Was that an average figure?

"A. It was done in discussion, Mr. Brauner. Before that figure was even reviewed, the figures which preceded it in the report were set up that it would be six months before a field test would be initiated that could be shared with others in the industry, that then it would be 12 months before that field test system would be adequate from the point of view of let us say all kinds of programs and ability to transmit signals so that others could share in the transmission, and looking back at the experience that has been had in the development of black and white standards and the review of those standards during 1944, and the work which has taken place during the past year in a consideration of color, those people who were present believed that 18 months was a proper estimate to make, that they could come to an agreement in 18 months.

"The Chairman: How much time would you leave for hearings? (Laughter)

"The Witness: I thought, Mr. Chairman, that question would be asked, and we discussed it from this point of view.

"In the case of the sequential system, it was zero time, because the Commission in its report on this hearing would decide the matter, and therefore zero time was allowed in the simultaneous system.

"On the other hand, there were expressions from some of those present that the consideration by the Commission could obviously be started before the 18 months' period was completed." (Docket 7896, pp. 1359-1360)

Dr. Jolliffe at the earlier portion of the hearing had testified, however, that it would be a matter of approximately 4 years before commercial standards could be set for the

simultaneous system. This was, of course, inconsistent with the later testimony of Dr. Engstrom that it would take only 18 months to set such standards. Dr. Engstrom, upon cross-examination, tried to wash away the inconsistency.

"By Mr. Brauner:

"Q. Mr. Engstrom, has your company advanced its time table as to the date on which standards could be adopted for a simultaneous system? It is my recollection that Dr. Jolliffe testified it would be approximately four and a half years.

"A. Not before standards could be adopted—before a service could be rendered, if I remember correctly.

[fol. 284] "Commissioner Jett: Dr. Joliffe is present and can correct me if I am wrong, but it is my recollection that he testified it would be four years before we could be able to establish standards for color television.

"The Chairman: Do you have the reference?

"By Mr. Brauner:

"Q. On page 674, Dr. Jolliffe said:

'In my opinion, to design, build, install and operate that equipment it will be a matter of approximately four years before you would get all the information that should be gotten, before you take the steps to finally approve commercial standards.'

"Commissioner Jett: Of course, Dr. Jolliffe made that statement before we were very far along in this hearing.

"The Witness: I think, Mr. Brauner, I would rather answer it from another point of view.

"In December of 1945, when we made our demonstration of the sequential, we estimated at that time that was of the order of five years before a color system could be made commercially equivalent to black and white at that time.

"We are now some 15 months advanced, and whether the industry has made 15 months of progress might be argued, of course, but if you take our original estimate, it would be something then in the order of four years from today.

"Now, the estimates made on a particular date five years in advance are subject to certain tolerance. I don't think basically we have changed our point of view on that, because the estimates that are in this report, provided by us come within the sphere of that earlier estimate and the estimates which we have made since then." (Docket 7896, pp. 1361-1362)

These lengthy excerpts establish beyond doubt that RCA and the RMA made a full fledged commitment to the Commission to field test and set standards for the simultaneous system within 18 months from the time when the Commissions 1947 decision rejected the CBS proposal. We know as a matter of fact that despite Dr. Jolliffe's guarantee that the simultaneous system would work, there has never even been a satisfactory radio broadcast of that system.

Even when the fundamental defects in the simultaneous system became known to RCA, RCA took no steps to inform the Commission that it had dropped the system. The industry must never have field tested it because not one of them made a progress report to the Commission that their field tests on the system had proven it impractical. Even [fol. 285] the head of the RMA engineering department, the man who was former head of the NTSC and RTPB and the present head of the current NTSC, Dr. W. G. R. Baker, never formally learned that the simultaneous system had been dropped. Dr. Baker testified as follows:

"The Witness: I would like to add this thought, and it may or may not be important. If I remember rightly, and this thing is pretty hazy to me, a lot of work was done on simaltaneous system, and it was found out that it was not the system to give a good system of color because of the transmission of the three simultaneous colors at the same time. Some place in there, I don't know just when it is, but I have the hazy recollection that the simultaneous system on further development showed negative." (Tr. p. 9758)

"Q. Now if this were a commitment in 1947 that consideration of standards for simultaneous system could start with agreement to be expected in 18 months, RMA could have set up an NTSC to try to get that agreement?

"A. They could, but I think what actually happened was RCA carried on the simultaneous system and found it was negative and therefore dropped it.

"Q. So what happened is RMA, having made that statement, whether it is a commitment or not, and then turned it over not to an industry group but to RCA and nothing happened, is that correct?

"A. Nothing happened because the results were negative.

"Q. The results were negative?

"A. Yes.

"Q. There were no standards, is that correct?

"A. The system didn't work out.

"Q. There were no standards, is that correct?

"A. There were no standards because the system proved faulty.

"Q. When did you first hear that the results were negative, Dr. Baker?

"A. I don't really know. I read that some place and I don't know. As I keep talking to you, my memory refreshes itself. I am sure that is what happened.

"Q. You read it some place?

"A. Yes, I think so.

[fol. 286] "Q. You, as the head of the RMA Television Engineering Department, didn't bother yourself checking, you had to read it somewhere?

"A. Yes, sure, that is right." (Tr. pp. 9760-9761)

Further proof *the* the lack of good faith of RCA, irrespective of the failure of the system, is a review of the promises made to develop equipments at the time the simultaneous system was held out as a bait to the Commission to adopt no color standards. This is all the more significant since even if propagation caused the downfall of the simultaneous system, the same studio equipment is now offered in connection with the dot sequential system. Inasmuch as the present RCA dot sequential system utilizes the same equipments as the simultaneous system did in 1946, and since RCA did not have any better developed equipment at the time of the present hearing, one can conclude that they learned shortly after the March 1947 decision rejecting sequential color that the simultaneous system was impractical and unsound. Had they carried out their promises over any extensive period of time after the March 1947 decision,

it would appear that they would have made progress in the commercial development of the three-tube or the tri-phospher tube for the receiver. We are therefore faced with one or both of two alternatives. RCA, with the largest electronic laboratory in the world, having found out that the simultaneous system would not work, delayed commercial color with inactivity in the face of the Commission's request for further color experimentation. The other alternative, which may be in addition to the first, is that RCA was not able to develop practical studio apparatus for the kind of system it fostered in both 1946-47 and 1949-50.

What we have demonstrated is that when the field sequential system was proposed by CBS in 1946, RCA offered as a still better system its own simultaneous system. It admitted, however, that its system, like the CBS system, needed further field testing. It emphasized, however, the very comprehensive nature that such field tests should take. While RCA may well have been on sound engineering grounds in advocating such comprehensive field tests, it so happened that as a result of this position on field tests color could always be put off for several years. Thus, in 1946, Dr. Jolliffe testified:

> "The Witness: My definition of an adequate field test is one in which you use a full-scale transmitter and have substantially commercial receivers installed in homes and a substantial number of homes and carry on a program service which is illustrative of a program service which might be used as a commercial service, and have that operate for a sufficiently long period of time that you can get the results of people who are observing these receivers and really get the reaction.
>
> "In my opinion, to design, build, install and operate that equipment it will be a matter of approximately four years before you would get all the information that should be gotten, before you take the steps to finally approve commercial standards." (Docket 7896, pp. 673-674)

[fol. 287] In 1949 a similar pattern was repeated. Once again, although this time not completely voluntarily, CBS offered the Commission a field sequential system which it claimed was ready for adoption, once final field tests had been completed. RCA again came out of its laboratory, ad-

mittedly prematurely, with a color system. This time it was a dot sequential system. RCA told the Commission its system was "developed". Its press releases indicated that RCA now had a full-blown color television system. Its first written comments filed with the Commission represented the dot sequential system as providing a superb color broadcast service; it certainly appeared that this system was an electronic ideal made real. However, as in 1946, it early became apparent that RCA was in no hurry for the adoption of color standards. It repeated its statements of 1946 with respect to the nature for long and comprehensive field tests before any color system, whether it be RCA's or CBS's should be adopted. By letter dated September 13, 1949 (Exhibit 208), Dr. Jolliffe wrote the Acting Chairman of the Commission:

> "The Radio Corporation of America believes that any system of television should be thoroughly tested in the field under conditions approximating as nearly as possible regular commercial operations. This applies equally to program production, transmitter operation, and *receiver operation in the home.*" (emphasis supplied)

In commenting on this letter, Dr. Engstrom stated:

> "I think that it is in keeping with my testimony, Commissioner, that until the system has been set up, and been operated in the form simulating as nearly as possible the way in which it will be set up after it is authorized as a service, it is unwise to freeze the standards to the extent that allocations are made and manufacturers produce equipment for the public." (Tr. p. 2765)

The RMA, of course, supported RCA's philosophy by admonition to the Commission to make haste slowly. One of its committees set out the requirement for 30 individual field tests.

RCA did not object to any of the 30 categories of field testing suggested by the RMA. Specifically, in the hearings, the chronology of RCA's attitude toward field testing was unfolded in the record as follows: At the very beginning RCA stated that final field testing of apparatus will not take place until the standards "are fairly well

known" (Tr. p. 2769). Testifying on September 30, 1949 (Tr. p. 2805), Dr. Engstrom stated that he believed that standards might be written after six months of field testing. It was not clear, however, exactly how these standards would be written. Dr. Engstrom testified that final standards should not be set; he hinted at an NTSC stating that the Commission should not set final standards without the cooperation of the industry (Tr. pp. 2801-2804).

As the hearing went on, under the lash of good CBS performance, on February 27, 1950, Dr. Engstrom testified that RCA was now ready to discuss the formulation of standards (Tr. pp. 6124-6125). Dr. Engstrom stated, how-
[fol. 288] ever, that while RCA was ready to lay down "the elements for standards", "there are certain items on which we do not have all of the information" (Tr. pp. 6124-6125). Dr. Engstrom stated that by the time six-month period elapsed from September 27, 1949, RCA would have had its tube and it would be in a position to discuss standards (Tr. p. 6130). Later that day, he stated that he had no mental reservations on the setting of standards for a color system "now" (Tr. p. 6153). On further questioning he said he was ready to discuss standards with the staff immediately, that it was not necessary to wait for the tube (Tr. p. 6163, 10874).

On April 4, 1950, Dr. Brown testified that the RCA system was ready for the establishment of basic standards (Tr. p. 7821). But again testimony was offered about field testing which would follow the adoption of basic standards (Tr. pp. 7823-7824). It was stated that such field testing would take six months and that during that period even though standards were adopted, commercial operation would not yet begin.

By May 3, 1950, it was apparent that the hearing would not fizzle out on a note of despair for color. Too many people were saying color was here now. Even the industry took the cue; with the demonstration of the triphosphor tube, the trade press dropped discussion of color as a phony issue to hold up television and heralded the advent of color. On May 3, 1950, General Sarnoff testified that the RCA system was ready for final standards (Tr. pp. 10046, 10058, 10062-10063). General Sarnoff stated that further field testing was not necessary. He was not sure whether or not numerical values for the standards had already been sup-

plied for the record (Tr. p. 10064) but stated that if they had not been furnished they would be supplied. Later on he conceded that numerical standards had not been supplied for the record (Tr. p. 10602). On his return to the stand, Dr. Brown supplied numerical values for the standards (Tr. p. 10721). Dr. Engstrom upon his return to the stand reiterated that the RCA system was ready (Tr. pp. 10874-10875).

Accordingly, we had here a clear representation by the RCA that as a matter of engineering, its system had been sufficiently field tested to be ready for full commercial standardization. Such a representation by what is probably the world's foremost electronics laboratory would, under ordinary circumstances, be entitled to great weight. However, it is believed that just as in 1946 and 1947 RCA made definite claims for the simultaneous system, so again in the present record the claim that the dot sequential system is now ready for standardization has been made solely because it wishes to head off adoption of the field sequential system.

The representations by RCA both through its lay and engineering witnesses are very significant because, without a shadow of a doubt, the RCA system is, from an engineering point of view, not ready for standardization. The RCA system is a system which makes use of several new concepts, such as dot interlace and mixed highs, in addition to time multiplex, none of which had ever been seriously field tested. Serious questions have been presented with respect to networking of the RCA system and with respect to the system's susceptibility to interference. Actually the field tests of RCA have included no networking. There has been no field testing of remote pickup equipment. [fol. 289] In any event, it would appear clear that receivers in the hands of the public, no matter how few, should at least meet the test of successful operation.[17] It is to be noted

[17] It must be remembered that before the standards were actually adopted for black and white in 1941, the Radio Corporation of America put on extensive campaigns to demonstrate black and white television to the public. Currently RCA has demonstrated its system over WNBW, but there has been no promotion of any kind so that the people may see the effect of their system in color. There has been

that Paragraph 160 of the RCA proposed findings states that the receiver- which were in the hands of FCC personnel were laboratory models. If this is so, no commercial models of RCA receivers have been field tested. It is still more significant that Dr. Engstrom admitted that the critical tuning on these receivers should be field tested. (Tr. pp. 10864-10865). Certainly a receiver which must be attended by one of RCA's top engineers, such as was the case when the Bureau of Standards operated the RCA receiver, has not met the test of simulated commercial operation (Tr. p. 11187). The attitude of RCA with respect to the field testing of its receivers is best summed up by the testimony of General Sarnoff who, when asked: "Do you think RCA has sufficiently shown the performance of its receivers in the home as a practical home television set?", replied, "I am assuming that the Commission has a little imagination in addition to some information, and that when they look at a set they can tell it as well as you can anyway, as to whether it is sufficient or whether it is not." (Tr. p. 10395)

In the face of the record with respect to the extent to which the RCA system has been field tested, the most recent RCA position is summed up in its brief that: These tests and demonstrations show that the RCA color television system is ready for immediate standardization and no further field testing is required in order for the Commission to set standards based on the RCA system.

The only conclusion that can be reached is that at the beginning of this hearing RCA truthfully admitted that its system needed more work before the Commission would be in a position to standardize upon it, since the industry was almost solidly opposed to the CBS system and they felt

---

no promotion of viewing their color signals in color, but rather the entire promotion has been toward viewing their system in black and white. Each time the color signals are broadcast the emphasis is made upon black and white reception. It can be said that they have not promoted viewing their color system in color because they did not have sets with the tri-phosphor tube, but RCA contended throughout this hearing until General Sarnoff took the stand that the three-tube receivers were meant for commercial sale. They certainly could have been used for demonstration purposes.

that there was no imminency of its being adopted. However, when it appeared that there was a fair chance that the CBS system might be adopted, RCA attempted to hold off such Commission action with the engineering bludgeon that the dot sequential system, too, was ready for commercial standardization.

[fol. 290] Such shifting of engineering representations in order to further RCA's personal interests renders questionable in great degree all of the other engineering promises it has made on this record. Inasmuch as the industry committee RMA by its silence acceded to this shift in RCA position with reference to the necessity for field testing, to the same degree its engineering representations are also rendered questionable. For it is one thing for an organization to take a policy position, such as being for or against color policywise, in furtherance of its own interests. It is quite another thing for an organization, through the mouths of its best engineers, to make engineering representations for the sole purpose of favoring its own interests. In the case of the engineering representation that the RCA system is presently ready for standardization, it is believed the RCA tactics with respect to color are made clear. RCA has one genuine purpose and that *was* to defeat color.

(Here follow 3 Photolithographs, side folios 291, 292, 293-294)

EXHIBIT "C" Complaint

54313-9/50

FCC 50-1065

FEDERAL COMMUNICATIONS COMMISSION
Washington 25, D. C.

In the Matters of	)	
Amendment of Section 3.606 of the Commission's Rules and Regulations.	)	Docket Nos. 8736 and 8975
Amendment of the Commission's Rules, Regulations and Engineering Standards Concerning the Television Broadcast Service	)	Docket No. 9175
Utilization of Frequencies in the Band 470 to 890 Mcs. for Television Broadcasting.	)	Docket No. 8976

SECOND NOTICE OF FURTHER PROPOSED RULE MAKING

1. Notice is hereby given of further proposed rule making in the above-entitled matters.

2. The Commission proposes to amend Part 3, Subpart E, of its Rules and Regulations ("Rules Governing Television Broadcast Stations") and Sections 1 and 2 of its Standards of Good Engineering Practice Concerning Television Broadcast Stations, in accordance with the "First Report of the Commission (Color Television Issues)" (FCC 50-1064) issued in these proceedings simultaneously with this Notice. Because of the size of the Report, it is not attached to this Notice, but copies of the Report are available on request at the offices of the Commission. However, for information of interested persons, paragraph 151 of that Report, relative to the adoption of bracket standards, is quoted, as follows:

> "151. In order to accomplish this purpose, the Commission simultaneously with the release of this Report is issuing a Notice of Proposed Rule Making providing for bracket standards in the present monochrome system. These bracket standards provide for a television composite video signal of substantially the type and proportion now employed in monochrome, but with the number of lines variable from 15,000 to 32,000 per second, and number of fields ranging from 50 to 150 per second. 33/ Receivers built to incorporate such bracket standards would

33/ The Notice provides that if the brackets are adopted, television broadcasters will continue, until further order of the Commission, to broadcast in accordance with present standards--15,750 lines per second and 60 fields per second

be equipped with a manual or automatic switch to select instantaneously between two sets of standards falling within the above ranges, one of which will be the present monochrome standards, and the other the CBS proposed standards. The receiver would produce pictures of equivalent size, geometrical linearity and brightness on each of the two positions of the switch. Interested persons are given until September 29, 1950 to submit comments. In addition, manufacturers are requested to submit a statement as to whether if the bracket standards are adopted they would, commencing with the effective date of the order adopting the bracket standards as final--30 days after publication of the order in the Federal Register--build all their television receivers so as to be capable of operating within the above brackets. If, on the basis of the comments submitted, the Commission is able to adopt the bracket standards as final without a hearing and if the Commission receives assurances from a sufficient number of manufacturers to insure that such bracket standards will be incorporated in the great majority of television receivers, then we will be in a position to postpone a decision in this proceeding since we will have the time to explore more fully the matters set forth above, confident in the knowledge that adequate provision has been made to prevent aggravation of the compatibility question. If the bracket standards cannot be made final without a hearing or if assurances are not received from a sufficient number of manufacturers concerning their plans for incorporating bracket standards in their receivers, the Commission will not feel free to postpone a decision, for every day that passes would aggravate the compatibility problem. In that event, a final decision would be issued adopting the CBS color standards."

3. The amendments proposed by this Notice provide for bracket standards as follows:

a. The scanning line frequency shall be within the bracket 15,000 to 32,000 per second.*

b. The field frequency shall be within the bracket 50 to 150 per second.*

* Until further order, television stations shall utilize the following standards: - the number of scanning lines shall be 15,750 per second, and the number of fields shall be 60 per second.

In other respects the transmission standards would not be changed by this Notice.

4. On or before September 29, 1950, any interested person who is of the opinion that the amendments proposed in paragraph 3 of this Notice should or should not be adopted, or should not be adopted in the form set forth, may file a written statement setting forth his comments or proposed amendments.

5. All manufacturers of television receivers are requested by the Commission to submit comments in accordance with paragraph 4 of this Notice, and to include in such comments an affirmative statement as to whether such manufacturers would, commencing with the effective date of the adoption of bracket standards*, design and manufacture all their television receivers so that:

(a) Such receivers would be capable of operating within the brackets set forth in paragraph 3 of this Notice,

(b) Such receivers would be equipped with a manual or automatic switch so as to be able to select one of the following two sets of standards:

(i) 15,750 lines per second and 60 fields per second.

(ii) 29,160 lines per second and 144 fields per second.

(c) Such receivers would be capable of producing monochrome pictures of equivalent size, geometric linearity and brightness on each of the above two sets of standards.

PROPOSED

6. In accordance with Section 1.754 of the Commission's Rules and Regulations, an original and 14 copies of such written statement shall be filed with the Commission.

7. Authority to issue the proposals herein is vested in the Commission by Sections 4(i), 301, 303(a),(b), (c), (d), (e), (f), (g), (h) and (r) of the Communications Act of 1934, as amended.

FEDERAL COMMUNICATIONS COMMISSION

T. J. Slowie
Secretary

* An order of the Commission adopting the bracket standards would become effective 30 days after its publication in the Federal Register.

Adopted: September 1, 1950

Released: September 1, 1950

[fols. 295-296] EXHIBIT "D" TO COMPLAINT

BEFORE THE FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON, D. C.

IN THE MATTERS OF

Docket Nos. 8736 and 8975

AMENDMENT OF SECTION 3.606 OF THE COMMISSION'S RULES AND REGULATIONS

Docket No. 9175

AMENDMENT OF THE COMMISSION'S RULES, REGULATIONS AND ENGINEERING STANDARDS CONCERNING THE TELEVISION BROADCAST SERVICE

Docket No. 8976

UTILIZATION OF FREQUENCIES IN THE BAND 470 TO 890 MCS. FOR TELEVISION BROADCASTING

COMMENTS OF RADIO CORPORATION OF AMERICA

September 28, 1950

[fol. 297] CONTENTS

THE COMMISSION'S PROPOSED CHANGE IN BLACK AND WHITE STANDARDS IS BASED UPON FUNDAMENTAL ERROR

ORIGINAL

A. The Commission Should Not Adopt a Color System with Which It Is Not Satisfied 4
B. Progress Cannot Be Served by Outlawing the New In Favor of the Old 6
C. The Performance Capabilities of the RCA System Have Not Been Recognized by the Commission 11
D. The Commission's Report Does Not Encourage the Larger and More Effective Use of Radio in the Public Interest 14
E. The Commission's Present Conditions for Consideration of Color Television Systems Are Inadequate and Unfair 17

THE PROPOSED BRACKET STANDARDS FOR BLACK AND WHITE TELEVISION ARE UNNECESSARY, COSTLY AND CONTRARY TO THE PUBLIC INTEREST

A. The Present Standards Should Not Be Abolished, Without a Hearing, in Favor of Bracket Standards 22

B. The Manufacture of Receivers Capable of Operating Under the Proposed Black and White Standards Would Be Contrary to the Public Interest 25

(i) Horizontal Synchronization and Deflection System 26

[fol. 298]

(ii) Vertical Synchronization and Deflection System 28

(iii) Power Supply System 29

(iv) Unjustifiable Additional Cost to the Public 30

C. Receivers Capable of Operating Under the Proposed Black and White Standards Cannot Be Produced Within the Time Schedule Specified by the Commission 32

D. The Manufacture of Bracket Standard Receivers Would Have an Inflationary Effect and Lower the Already Critically Short Supply of Television Receiver Components 33

CONCLUSION 34

Annex A

Commission's Report Conflicts with Condon Committee and RCA Progress Reports 36

Annex B

Additional Errors in Commission's First Report 41

Annex C

Condon Committee Report 53

Annex D

RCA Progress Report 55

Annex E

Letter dated May 3, 1950 from T. J. Slowie to Radio Corporation of America 65

[fol. 299] Radio Corporation of America (RCA) submits herewith its comments with respect to the Second Notice of Further Proposed Rule Making released September 1, 1950 (FCC 50-1065).

The Commission's Notice requests comments regarding a proposed change in the black and white television standards. It is clear from the Notice, and the Report on Color Television upon which the Notice is based, that the major reason for the proposed change is the Commission's attempt to make possible the adoption of the incompatible low-definition CBS color system. The first part of these [fol. 300] comments is addressed to this purely color reason for the proposed change in the black and white standards.

The Commission's Proposed Change in Black and White Standards is Based upon Fundamental Error

RCA believes the First Report is wrong

In the opinion of our engineers the Commission's decision is scientifically incorrect. RCA will continue research, development and improvement of its compatible, all-electronic, high definition color system notwithstanding the First Report of the Commission.

RCA does not propose to adopt the attitude of CBS in the 1946 hearing, where CBS stated that if its system were not adopted CBS would quit research in color.

We expect to continue to broadcast color signals under the RCA system and to use every scientific resource at our command to further the progress of color. We cannot acquiesce in a decision with respect to difficult scientific questions where the professional judgment of practically the entire industry is united that the public is about to be saddled with an inferior system. We believe that such a decision would violate the Commission's obligations under the law and would deny the public, the broadcasters and the manufacturers their rights under the law.

Where as here we have a conflict between the learned

scientists comprising the Condon Committee* and the mem-
[fol. 301] bers of the Commission, that conflict should be resolved by the jury which is going to have to live under the color system adopted. That jury is the American people. In view of the situation in which the Commission now finds itself, the Commission should permit the broadcast of color signals under both the CBS and the RCA systems for a reasonable period of time before adopting final standards. We await the verdict of the public with confidence. No matter what it is we shall abide by it.

The Commission completely disregards the interests of the 10,000,000 or more American families who will own present models of black-and-white receivers by the end of this year. These 10,000,000 families represent an audience of 40,000,000 or more people.

The Commission's Report clearly shows that the Commission itself is not satisfied with the CBS system and that the CBS system is inadequate. Yet the Commission threatens to adopt the CBS system now unless the industry will yield to impossible and illegal conditions.

The Commission's Report shows that it is based on scientific errors, and that the Commission admittedly does not understand the RCA all-electronic, high-definition, compatible color system. The Commission has the obligation to inform itself as to the basic principles of this system and the superior performance which they make possible.

The adoption of bracket standards is unnecessary, costly and contrary to the public interest. The adoption of bracket standards is obviously a make-shift compromise proposal, serving perhaps to obtain unanimity within the Commission, but failing to serve the public interest.

[fol. 302] It would be difficult to over-emphasize the importance of the issue before the Commission. It is faced with the adoption of standards which should last for dec-

* This Committee was headed by the Director of the National Bureau of Standards and was organized to give the Senate Committee on Interstate and Foreign Commerce "sound, impartial, scientific advice" on color television. The Committee was "a small group of scientific persons of repute, none of whom are employed by or have any connection directly or indirectly with any radio licensee or radio-equipment manufacturer".

ades. No question before the Commission so clearly calls for action in the long-range interest of the public.

A. The Commission Should Not Adopt a Color System With Which It is Not Satisfied

Preeminent among the reasons why RCA opposes the action of the Commission is a point of principle. That point of principle is that the Commission should not, merely in order to do something about color now, adopt a color system with which the Commission itself is not satisfied, and which is not in the public interest, convenience or necessity.

The Commission's Report clearly recognizes that compatibility, high resolution, large direct-view picture size, and other advantages of the RCA color television system are essential attributes of any color television system. Yet the Commission's Report would outlaw the RCA system in favor of the CBS system which has shown none of these attributes.

The Commission recognizes that the CBS system should not be adopted because it is not compatible—or the Commission would not propose "bracket standards" and seek to compel manufacturers to build receivers to accept degraded CBS standards as well as the present high-quality monochrome standards. The RCA system is completely compatible.

The Commission recognizes that the CBS system should not be adopted because of its degraded resolution—or the Commission would not desire more information as to the increased resolution obtainable with horizontal interlace [fol. 303] in the CBS system. Horizontal interlace is an integral part of the RCA system.

The Commission recognizes that the CBS system should not be adopted because of the picture-size limitations and other defects inherent in a disc-type mechanical system—or the Commission would not seek to postpone its decision until it can be assured that the system ultimately adopted shall be all-electronic and utilize the tri-color tube, developed and demonstrated on the record by RCA.

Faced with such a situation, where the Commission itself has such serious and valid objections to a system, the only course open to the Commission is to stay its hand.

The Commission's Report expresses doubts as to the

RCA system—doubts with respect to its color fidelity, the brightness of its receivers, and even its resolution. It is largely on the basis of such doubts that the RCA system has been put aside.

Conversely, while the Report clearly recognizes and the Notice is based upon the incompatibility, degraded resolution and other defects of the CBS system, the Report would nevertheless adopt that system on the "speculation and hope" that some of these defects—but not incompatibility—may in the future be overcome.

The public interest cannot be served by adopting an inferior system now, simply to be doing *something* now. Acting in favor of a ten year old incompatible system on the "speculation and hope" that a permanent ceiling will not have thus been placed on the progress of color television, rather than to give the new and superior system an opportunity to prove its potentialities, is unjustifiable.

[fol. 304] The adoption of the degraded standards of the old system is to ensure that a ceiling has been placed upon the development of color television. To adopt the higher standards of the newer system is to leave full scope for future development, and the attainment of far higher ultimate performance than is possible with the old.

In spite of these obvious facts the Commission's Report judges the ten year old incompatible system by far more lenient standards than those which it applies to the new high-definition compatible system which has only just begun to realize its potentialities. The Commission hopes that the recognized defects of the old system may be cured; it doubts that the alleged defects of the new system can be overcome.

B. Progress Cannot Be Served By Outlawing the New in Favor of the Old.

The Commission would outlaw the RCA system for all time because it was dissatisfied with what it saw at four demonstrations, the last of which was in April—only eight months after the new system was announced. Detailed technical expositions of the RCA color television system are contained in the record. But the Commission has apparently based its conclusion that the RCA system should be outlawed upon the basis of what it saw on the face of the receivers demonstrated, without understanding the

principles of the system involved in these demonstrations.

In fact, the Report of the Commission prefaces its description of the RCA system with the statement that the Commission has found it difficult to describe the RCA system because "it involves new and complex techniques, many [fol. 305] of which were never clearly expounded during the hearing." Instead of satisfying itself as to the merits of the RCA system through understanding the alleged "new and complex techniques" involved, the Commission sought to judge the RCA system on the basis of the performance of laboratory apparatus.

Thus we find the Commission stating:

(a) ". . . at all of the demonstrations . . . there was *evidence of* faulty registration."*

(b) "At all of the *demonstrations* : . . RCA *had difficulty* producing a color picture with adequate color fidelity."

(c) "Picture texture was . . . marred at all of the *demonstrations* . . . by the visibility of dot structure at distances at which the lines *begin* to be unresolved."

(d) ". . . at that *demonstration* [of RCA direct-view tri-color tube receivers] there was *evidence of* faulty registration."

(e) ". . . as *demonstrated*, the tube developed insufficient illumination, it had an inadequate number of dots and it had a serious moire pattern in it."

These are very ingeniously phrased statements. They convey impressions which the words do not literally say. For example, it is not said that the RCA system has faulty registration, but that, at the demonstrations, there was "*evidence*" to that effect. Nor that the RCA system is incapable of color fidelity, but that, at the demonstrations, RCA "had difficulty" producing adequate color fidelity. [fol. 306] Even with respect to the recently developed RCA direct-view tri-color tube, which was demonstrated on April 6 with a highlight brightness of 7 footlamberts, the Commission has said there is "some doubt" whether the RCA system will permit "much higher brightnesses" for such a tube. There is no more basis for this statement than

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* Here and throughout the Comments emphasis has been supplied.

for the others.* RCA has already developed brightness many times that displayed on April 6.

The very same apparatus which the Commission saw was also viewed by a group of distinguished experts—the Committee headed by Dr. Edward U. Condon, Director of the National Bureau of Standards. They saw that apparatus for what it was intended to be—the demonstration of electronic principles. It is clear from their report† and their determination that the RCA system is entitled to 11 awards as the technically "superior system" against 8 for the system proposed by CBS that the Condon Committee did not confuse the distinction between laboratory apparatus and the principles of the system.

The error of the Commission's approach in judging the system which it describes as involving "new and complex techniques" by what it could see on the face of the receivers without adequate regard to the principles which were demonstrated by those receivers can be shown by an example.

We may take the invention of the airplane, and its first "demonstration" by the Wright brothers at Kitty Hawk. If we use the Commission's approach, this "demonstra- [fol. 307] tion" showed that the airplane could *not* be used as a means of passenger transportation, since the plane carried only the pilot. This is the static theory—to confine the significance of the "demonstration" to what was shown that day.

The dynamic approach would take that demonstration for what it was—the demonstration that an airplane *can be* a practical means of transportation. It would recognize that the statistics of that day in 1903 had only historical significance. It is true that only one person was carried by the plane. The weight which the Wrights got into the air

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* Some other respects in which the Commission's Report is in error are set forth in Annex B.

† *The Present Status of Color Television*, Report of the Advisory Committee on Color Television to the Committee on Interstate and Foreign Commerce—United States Senate, Senate Document No. 197, 81st Cong., 2d Sess. A copy of this Report is included in these Comments as Annex C, and examples of conflict between this Report and the Commission's Report are set forth in Annex A.

was but 750 pounds. Their maximum speed was only 30 m.p.h. The longest flight duration but 59 seconds. And, to say the least, their techniques were "new and complex".

But who remembers these statistical footnotes today? What is important and what the world does remember is that the Wrights had demonstrated a principle. The dynamics of the aircraft industry could and did translate these statistics into the airplane of today.

Applying the Commission's approach to the RCA system to the Wright brothers' demonstration at Kitty Hawk, the Commission would state:

> ". . . as demonstrated, the plane developed insufficient speed (30 m.p.h.), it had an inadequate carrying capacity (750 lbs.), and it had a serious limitation on duration of flight (59 seconds)."

It would follow that the airplane should never be approved as a means for public transportation.

Whether or not the Commission feels the RCA system is made "complex" by the introduction of new techniques, it is startling to find this asserted as a point *against* that [fol. 308] system. In this connection an observation by the distinguished scientist and President of Harvard University—James B. Conant—is of interest:

> "Tremendous spurts in the progress of the various sciences are almost always connected with the development of a *new technique* or the sudden emergence of a new concept."*

The RCA all-electronic, compatible, high fidelity color television system with its tri-color tube has been hailed by the scientific world as a major development in electronics. But it is this system that the Commission proposes to outlaw on the basis of four demonstrations simply because it is new, and the Commission says it is difficult for it to understand.

A salient example of the Commission's failure to understand the RCA system is the statement that in the RCA system "color control is exceedingly difficult to maintain." In this connection it refers to a tolerance of 1/11,000,000 of

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* Conant, *On Understanding Science* (1947) pp. 73-74.

a second. Of these statements, the first is wrong and the other misleading.

The ordinary black and white television receiver provides an accuracy in its synchronization process which is of the same order. If the synchronized horizontal scanning wave in such a receiver were to be shifted in time by 1/7,000,000 of a second in successive frames, details of the picture would be mislocated by approximately the width of a normal picture element, thereby losing half the picture resolution. Since most receivers suffer no appreciable loss of resolution, even in the presence of a noisy signal, the accuracy provided is far better than 1/11,000,000 second.

[fol. 309] For black and white television receivers the required accuracy is obtained through the use of automatic frequency control circuits. These same circuits can be effective in maintaining the needed accuracy for color television. The receiver circuit functioning is synchronized by the "burst" precisely at the start of each scanning line. Consequently the color control circuits are "on their own" for only 1/15,750 second, or the time of one scanning line.*

Tolerances of this order are encountered in many types of electronic equipment, such as radar and shoran upon the operation of which the safety and lives of men depend.

C. The Performance Capabilities of the RCA System Have Not Been Recognized By the Commission

The Commission's approach to the RCA system—its doubts with respect to that system—and its preference for the ten-year old CBS system give no effect to the dynamic nature of the electronic industry or to the potentialities of the RCA system. The capacity of the RCA system for spectacular and rapid simplification in equipment design, while improving equipment performance, is nowhere referred to.

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* Mr. Donald Fink, the editor of *Electronics* magazine, a member of the Condon Committee, and a disinterested expert in this field, stated at the hearing that

> ". . . the stability with which synchronizing circuits of black and white receivers have turned out to work in the home is ample evidence that the synchronizing of dot interlace can be accomplished in the same manner and with about the same degree of success."

Last October RCA demonstrated laboratory models of color sets of the 3-kinescope type. They had more than 100 tubes. Within six months, when the RCA direct-view [fol. 310] tri-color tube receiver was shown, this number had been cut to 46 in one set and 37 in another.

In October Dr. Goldmark of CBS took the position that "nothing" could improve the RCA system. He later admitted, on the record, that the RCA picture had improved "a thousand percent".

CBS' own expert, Dr. Judd, of the National Bureau of Standards, stated that he had seen a demonstration of RCA color which

> ". . . was the equal of any of the CBS shows on color fidelity".

One of the Commissioners commented that

> ". . . we have seen that [the RCA system], and it produced beautiful color".

Another Commissioner remarked, in respect to the RCA system, that

> ". . . your picture is greatly improved since your first showing".

In spite of these observations with respect to color fidelity, the Report of the Commission says that ". . . there appears to be no reasonable prospect that these difficulties in the RCA system can be overcome . . ." and that "It is difficult to see how these defects can be eliminated". Again ". . . it is difficult to see how color control can be simplified . . .".

For RCA's part it has never for a moment assumed it would not be "difficult" to deal with problems in this field of research. * But RCA has never shared the Commission's [fol. 311] defeatist attitude in respect to them. On the contrary RCA has felt and expressed the same confidence that its competitors in research expressed on the record.

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* President Conant again is in point. In the book refered to he said:

> ". . . new concepts only develop after an arduous period of experimentation." (p. 36)

Referring, for example, to the problems of registration, Dr. DuMont said

> ". . . there are ways and means to overcome that".

Dr. Goldsmith, the Director of Research of Allen B. DuMont Laboratories, said

> ". . . the registration problem is just an equipment limitation at the present time, it is not a fundamental limitation. It can be overcome completely".

Dr. Baker, the head of the Electronics Division of General Electric, testified

> "I feel confident that it [registration at the camera] can be licked".

Mr. Donald Fink, the editor of *Electronics* magazine and a member of the Condon Committee, said that registration

> ". . . is a problem which . . . can be approached . . . on a strictly engineering basis, to improve it in the same way as we have improved everything else in television".

All but unanimously the industry has recommended the adoption of an all-electronic, compatible, high definition color television system—such as the RCA system. Neither the industry nor the Condon Committee was daunted by the doubts which appear in the Commission's Report. Further, the statements set forth in the RCA Progress Report [fol. 312] of July 31* confirm the testimony of industry experts and the statements in the Condon Report as to the potentialities of the RCA system.

We believe that in a rule-making proceeding of the importance of this one, it is the duty of the Commission, before making findings at odds with those of a group of scientists of the stature of the Condon Committee, to keep the record open and to inform itself as to the basis for the findings of that Committee.

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*A copy of this Report is included in these Comments as Annex D. Examples of conflict between the technical testimony, confirmed by the RCA Progress Report, and the Commission's Report are set forth in Annex A.

We believe that, in the circumstances, the Commission had the same obligation with respect to the RCA Progress Report. That report was given to the Commission a month before its decision. If the testimony of the electronics experts to whom we have referred had been accepted, there would of course have been no need to consider a report which said that improvements which had been promised during the hearing had actually been accomplished. But a decision was drafted which rejected that testimony and outlawed a system on the basis of alleged defects which the Progress Report said had already been eliminated. This, we submit, was to turn its back on evidence when the Commission had an obligation to look.

D. The Commission's Report Does Not Encourage the Larger and More Effective Use of Radio in the Public Interest

Section 303(g) of the Communications Act of 1934 as amended provides that the Commission shall "encourage the larger and more effective use of radio in the public interest". As one of the Commissioners has expressed it, the Commission

> [fol. 313] ". . . has the affirmative, statutory duty to look to the future. Section 303(g) of the Communications Act provides that the Commission shall '. . . encourage the larger and *more effective* use of radio in the public interest'. In fulfilling this statutory mandate we cannot simply be content *with what is here today*, but we must look to see *what may be tomorrow, what new developments* radio may bring . . ."*

The task before the Commission is the adoption of standards that should last for decades. The Commission is passing on systems; not merely on the apparatus of today. The statutory obligation is clear. The Commission has the duty to adopt a long-range concept of what is in the interest of the public. The outlawing of the RCA system in favor of the CBS system cannot be squared with the Commission's statutory obligation.

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* From the speech by Commissioner Hennock on September 15, 1950.

As Mr. Fink pointed out, the fixing of standards has an ominous negative aspect. Standards place a ceiling on progress. That ceiling must therefore be a high one. In its decision of 1947 relating to color standards the Commission stated that

> "Before approving proposed standards, the *Commission must be satisfied* not only that the system proposed will work but also *that the system is as good as can be expected within any reasonable time in the foreseeable future.*"

Instead of adhering to a long-range view, the Commission's present Report is based on short-range considerations. It looks only to "what is here today". It does not say we must have an "excellent" color system by today's standards, in order that that shall be at least "good" by tomorrow's. It is ready to settle for an "adequate" system of today.

[fol. 314] In 1940 and 1941 the Commission held out strongly for higher definition and *the fullest utilization of the bandwidth.* In adopting the present monochrome system in 1941 it pointed out that

> ". . . 525 lines provide for *greater detail* in the pictures transmitted than the 441 lines advocated a year ago. They . . . more fully exploit the possibilities of the frequency bands allocated for television".

But now the Commission is willing to settle for 405 lines. It characterizes these as giving "adequate apparent definition".* The Commission has admitted that the CBS system

> ". . . has *less* geometric resolution than the present monochrome system".

It purports to justify this degradation in color standards by the statement that

> ". . . the addition of color more than outweighs the loss in geometric resolution so far as *apparent* definition is concerned".

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* It should be noted that the language is doubly hedged. It is not even "adequate definition". It is only "adequate *apparent*" definition.

If the Commission is to meet its statutory obligation to promote "the *more* effective use of radio", we believe it must provide for a system of color television in which the element of color is *a plus factor,* when compared with the monochrome system, and not a factor used to make up for degradation of resolution which the monochrome system does not have. The Condon Committee found that this could be done. Their approach was that in adopting a color system the public could have color as an added factor and not a balancing factor.

[fol. 315] There is no reference whatsoever in the Commission's decision to the desirability of a system which most fully exploits the possibilities of the frequency bands. The Condon Committee does refer to this and says that it is one of the outstanding points of superiority of the RCA system.

In dealing with brightness the Commission again is willing to settle for what it claims is "adequate" brightness.

In connection with the reception of color transmissions in monochrome, the Commission takes what is perhaps its most extreme position in respect of standards. The defeatist attitude of the Commission, its disregard of the public service, is epitomized in its discussion of this point, where it states:

> "There appears to be no alternative to some *degradation* in the quality of the black and white picture from color transmissions . . ."

If ever the public was entitled to conclude that a system had been damned with faint praise, that conclusion is justified with respect to the CBS system on the face of the Commission's Report.

E. The Commission's Present Conditions for Consideration of Color Television Systems Are Inadequate and Unfair.

In the Commission's Notice of Hearing for this case, there were stated two requirements which any color television system proposed had to meet. These were (1) that the system should operate in six megacycles; and (2) that

[fol. 316] existing television receivers should be able to receive the new transmissions

> ". . . simply by making relatively minor modifications in such existing receivers."

RCA met both requirements in the most dramatic and satisfactory way. With the RCA all-electronic high definition compatible system no change at all is required in existing receivers and all programs may be received on such receivers without any degradation of picture quality.

In the case of the CBS system on the other hand, modifications of existing receivers are necessary. Even then the existing receivers can receive only a degraded picture from the color transmission.

CBS urged that these modifications of existing receivers were minor. The Commission has now stated that the manufacture of continuously adjustable bracket standard receivers is the way to provide for the reception of CBS color on future black and white sets. This change in the Commission's determination as to the way in which the CBS color transmissions should be received on black and white sets requires major modifications in black and white sets. As a result CBS does not meet one of the basic conditions on which the entire hearing was held. The Commission's Report disposes of this difficulty in the CBS system by leaving this point out of its present list of conditions for the consideration of a color television system. Thus the case was tried on one basis and decided on another.

Indeed the new list of conditions for the consideration of color television systems is notable for its omissions rather than for what is included. Neither compatibility, high defi- [fol. 317] nition, nor absence of limitations on picture size are specified as conditions, although it is obvious that these three factors are of the greatest importance to the Commission, the industry and the public.

It is conceded by all parties on the record that compatibility is of the utmost importance. It is compatibility that makes it economically practical for the broadcaster and the sponsor to broadcast

> in *color*
> their choice programs
> in choice time

as soon as standards for a compatible system are approved.

With a compatible system the broadcaster does not have to wait for color receivers to appear in quantity. Nor does he have to confine color broadcasts to fringe time. Thus the most important single factor in this hearing, from the standpoint of insuring an early development of color television, is compatibility.

The Commission makes a bow to the economics of broadcasting by specifying that cost of station equipment must not be so high as unduly to restrict the class of persons who can afford to operate a television station. However, in the economics of broadcasting the cost of station equipment is a very minor matter in comparison with the matter of circulation revenue, as CBS itself has conceded on the record. The latter could of course be preserved by the adoption of the RCA compatible system. Thus the Commission's conditions include a factor of minor importance to the broadcaster, of no importance to the public or to the owners of television receivers, while they omit compatibility, a factor of major importance to the [fol. 318] broadcaster and of major importance to the public and to the owners of television receivers.

The Commission also makes a bow to the importance of high definition and absence of limitation on picture size. This is not done in the specified conditions for consideration of a color television system but by the interest displayed in dot interlace and the use of the tri-color tube in the CBS system.

None of these three essential factors for any color television system, however, is specified by the Commission as having any bearing at all upon the ultimate adoption of color television standards.

To omit these factors in listing the conditions essential to a color television system is to depart from the Commission's obligation to serve the public interest. While the omission of these factors would enable the Commission to adopt an inferior color television system, the omission clearly does not aid the Commission in performing its statutory obligations.

The answer to the question whether one would prefer to own a horse and buggy or an automobile today seems obvious. But if you exclude the factors of speed, endur-

ance and comfort, some might feel that the answer would be entirely different.

The Proposed Bracket Standards for Black and White Television Are Unnecessary, Costly, and Contrary to the Public Interest

The Commission's Notice proposes changing the present 525 line 60 field black and white standards which have been in existence for nine years. The Commission's Notice [fol. 319] does not propose any specific change in lines or fields. The Notice would instead substitute for the existing standards a line frequency variable from 15,000 to 32,000 per second and a field frequency ranging from 50 to 150 per second.

The Commission's Report, upon which the Notice is based, indicates that the Commission's proposal to adopt these variable standards for black and white television rests upon two considerations:

(a) The Commission's apparent desire to depart from the established practice of fixing a specific number of lines and fields on the basis of a hearing directed to those specific values; and

(b) The Commission's desire to be in a position to adopt the incompatible CBS color system at some later date without regard to the incompatibility, degraded resolution and other defects of that system.

In so far as the Commission's proposal to change the black and white standards rests upon its desire to adopt the CBS color system, the proposal is without foundation. As has been set forth above, the Commission's rejection of the RCA color system is entirely unwarranted since the only basis upon which the Commission's report would adopt the CBS system is the absence of a practical compatible system. But there *is* an entirely practical compatible system—the RCA system.

In addition, the Commission's Report recognizes that more must be done with the CBS system before it should be adopted. The only *color* reason for bracket black and white standards is to obtain the time believed necessary to improve the CBS system. This time is to be obtained [fol. 320] by imposing the unnecessary cost of bracket standard receivers upon the public for an indefinite period.

This burden on the public is unjustifiable particularly in view of the fact that the RCA system has greater potentialities for improvement—and superior ultimate performance—than the CBS system. Furthermore, the potentialities of the RCA system can be realized within the fundamentals of the present television standards,* thus making bracket standards entirely unnecessary and imposing no additional costs on the public.

The reasons set forth below against the adoption of the bracket standards and against the manufacture of bracket standard receivers, from the standpoint of the black and white service, also tend to establish even more firmly that the proposed change is not desirable in order to provide for color service.

A. The Present Standards Should Not Be Abolished, Without a Hearing, In Favor of Bracket Standards.

The present standards for black and white television (15,750 lines per second and 60 fields per second) were adopted in 1941 after extensive public hearings and equally extensive consultation with various industry committees. No change in such standards, and particularly no change of the scope now proposed by the Commission (line frequency variable from 15,000 to 32,000 per second and field frequency ranging from 50 to 150 per second), should be adopted without adequate hearings and industry study. [fol. 321] The Commission's Notice seeks the adoption, on 28 days' notice and without a hearing, of standards which include any and all combinations of lines and fields within the very widely specified limits of the proposed bracket standards. In 1941, the precise combination of 525 lines and 60 fields was carefully arrived at by the Commission after bitterly contested hearings arising from conflicting engineering views as to what particular combination would best serve the public interest, convenience and necessity.

The procedure provided by the Commission since 1941 for all changes in television standards is set forth in the

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* The standards which RCA has proposed for its color system include all those currently in effect for black and white television. The additional standards which must be added for color have no effect upon the operation of black and white receivers.

Commission's Rules (Section 2, Part B of the Commission's Standards of Good Engineering Practice Concerning Television Broadcast Stations). These rules provide that the Commission will not consider a proposed change or modification of transmission standards adopted for television except upon petition setting forth (a) the exact character of the change proposed, (b) the effect of the change upon all other transmission standards for television broadcast stations, (c) the experimentation and field tests that have been made to show that the proposed change accomplishes an improvement and is technically feasible, (d) the effect of the proposed change upon operation and obsolescence of receivers, (e) the change in equipment required in existing television broadcast stations for incorporating the proposed change, and (f) the facts and reasons upon which the proposed change would be in the public interest, convenience, and necessity.

The Commission's Notice does not set forth the information required by the Commission's rules, and such infor- [fol. 322] mation is not made available by the record in the hearings in the color phase of the above entitled proceedings. There is no evidence in the record regarding any of the six items specified in the Commission's rules with respect to changes in standards, for no proposal was made in these proceedings for any change in the black and white standards until the issuance of the Notice.

The Commission has indicated in its Report that the only advantage of bracket standards to the black and white service itself is the bare possibility of working out sometime in the indefinite future a combination of lines and fields, which, in utilizing horizontal interlace and long persistence phosphors, might make more effective use of those developments than would the present combination of 525 lines 60 fields.

The possibility that the adoption of bracket monochrome standards now would lead in the future to a better black and white picture is only a speculation. But it is certain that the adoption of such standards now and the manufacture of bracket standard receivers in accordance with the Commission's specifications would immediately result in a substantial increase in the cost to the public of television receivers.

There is no evidence in the hearings of the color phase of the above entitled proceedings with respect to bracket standard receivers of the kind now called for by the Commission. The evidence in those hearings related simply to an internal or external adapter which, when added to then current models of black and white receivers, would enable them to receive either 15,750 lines 60 fields or 29,160 lines 144 fields per second. Engineering data or cost esti- [fol. 323] mates relating to such internal or external adapters are not relevant to the bracket standard receiver which must be capable of operating at any combination of lines and fields within the wide range prescribed by the Commission.

B. The Manufacture of Receivers Capable of Operating Under the Proposed Black and White Standards Would Be Contrary to the Public Interest

The Commission has asked manufacturers of television receivers whether they will design and manufacture television receivers capable of operating within continuously variable standards, having a switch so as to be able to select one of two specified sets of standards, and capable of producing black and white pictures of equivalent size, geometric linearity and brightness on each of two specified sets of standards. In addition, the Commission has asked the manufacturers whether they will commit themselves to the manufacture of such receivers not later than 30 days after the publication of the bracket standards in the Federal Register; this commitment to cover each and every television receiver made by such manufacturer after that date.

In the time, and with the information, available since the issuance of the Commission's Notice, RCA has not been able to complete designs of the receivers specified in the Commission's Notice. Because these designs have not been reduced to practical apparatus and tested, they are necessarily subject to change as experience may require. On the basis of the designs developed so far, it is apparent that the receivers called for by the Commission's Notice will require a major redesign of existing receivers, rather [fol. 324] than merely the addition of circuits and components. For example, in order to meet the proposed standards, the horizontal synchronization and deflection

system must be revised. In addition, the vertical synchronization and deflection system and the power supply system must also be revised.

(i) *Horizontal Synchronization and Deflection System*

The Commission's proposed bracket standards require that the horizontal line frequency be variable within the bracket 15,000 to 32,000 cycles per second. When television standards were first being considered, proposals were made for flexible television standards which would require a variable line frequency. At that time the synchronizing circuits employed were of the "triggered" type and capable of a relatively wide range of frequency adjustment. The "triggered" type of horizontal synchronizing circuit has since become obsolete because of its susceptibility to interference.

Modern receivers employ the "automatic frequency control" type of horizontal synchronizing circuit which provides a very high degree of noise immunity. This noise immunity is achieved through the use of circuits with inherent frequency stability; thus the horizontal synchronizing circuits now employed are adjustable over a very limited frequency range.

Therefore, in order to meet a frequency range such as proposed in the Commission's Notice, it is necessary to change the circuit constants in steps, each of which will cover only a limited range of frequencies. Expensive switching arrangements are thus necessary to provide the [fol. 325] horizontal frequency range from 15,000 to 32,000 cycles per second.

The proposed CBS standards of 144 fields and a horizontal frequency of 29,160 cycles per second call for a horizontal blanking time of between 16 and 18 percent. In order to meet a 16 to 18 percent blanking time for the horizontal frequencies in the proposed bracket standards, a retrace time in the receiver of approximately 4 microseconds will be necessary. This retrace time is approximately one-half that now employed in present monochrome receivers. Meeting the 4 microsecond requirement necessitates major changes in the horizontal deflection circuits.

Among the changes required in present television receivers, in addition to provision for manual or automatic

switching between two sets of standards in order to meet the requirements of the proposed bracket standards are:

(a) A higher powered and more expensive output tube for horizontal deflection must be substituted for the tube presently used.

(b) A more expensive horizontal deflection transformer and circuit must be employed in the receiver. This transformer must have approximately one-half the inductance and one-half the distributed capacity of the present transformer and be capable of handling additional power.

(c) A damper tube circuit which provides the desired picture linearity must have double the power-handling capabilities. An additional damper tube will be necessary to meet this requirement.

[fol. 326] (d) The deflection yoke must be redesigned to provide greater protection against voltage breakdown, since higher potentials are produced.

(e) An additional filament transformer is required to supply the heaters of the two damper tubes.

(f) Additional items are necessary for the horizontal circuit as follows:

2 linearity coils
2 width potentiometers
3 linearity capacitors
1 sine wave transformer with taps
2 sync separator resistors
8 miscellaneous resistors

(ii) *Vertical Synchronization and Deflection System*

Since the vertical synchronization circuits are essentially of the "triggered" type, the modifications to the vertical circuits to cover the range from 50 fields to 150 fields are not as great as the changes which are required in the horizontal deflection circuits. The changes required involve provision for manual or automatic switching between two sets of standards and additional components as follows:

2 vertical hold potentiometers
1 height potentiometer
1 vertical linearity potentiometer
8 miscellaneous resistors.

[fol. 327] (iii) *Power Supply System*

The reductions in the price of television receivers which have been achieved, have in large part resulted from the more efficient use of materials and components. For example, the power supply system used in these receivers is designed to handle only the requirements of a specific receiver. In order to supply the additional power required by the changed horizontal and vertical deflection systems, a larger power supply system must be employed. The following power supply changes are necessary in RCA's present receivers in order to meet bracket standards:

(a) The power transformer must be increased in power-handling capabilities to provide the increased power required by the horizontal and vertical deflection circuits.

(b) An additional rectifier tube is necessary to handle the required current.

(c) Since the bracket standards involve frame frequencies which are not synchronous with the power supply frequency, increased magnetic shielding will be required. This shielding includes a magnetic shield box for the power transformer and special magnetic shields for the cathode ray tube.

In addition to the components set forth above, various switches are also required in order to meet the Commission's specifications. These switches will permit selection between two sets of standards and will vary in number and complexity depending on whether they are automatic or manual.

[fol. 328] Automatic switching for the bracket standards would require the following additional components in an RCA receiver:

1 tube
1 20-contact relay for horizontal deflection circuit
1 6-contact relay for vertical deflection circuit
1 tuned circuit for the horizontal deflection frequency
Miscellaneous components, including resistors and capacitors

RCA believes that, even assuming bracket standard receivers could ever be commercially acceptable, they would

have to include automatic switching. RCA's experience shows that the viewing public will be unwilling to leave their seats and operate a manual switch every time a broadcaster changes from one type of transmission to another.

(iv) *Unjustifiable Additional Cost to the Public*

For a medium priced set the additional cost to the consumer which would be involved in the manufacture of the proposed receivers is estimated at approximately $61 for the automatic type of continuously adjustable internally adapted bracket standard receiver. If RCA should build and offer a receiver which would be in all respects the same except that the operation would be manual instead of automatic the additional cost to the consumer is estimated at approximately $50.

Current industry production is at the rate of about 6,500,000 sets a year. On the basis of the figure for the automatic type receiver, the increased cost to the public [fol. 329] which would result from the Commission's proposal would be approximately $400,000,000 per year. For this tax on the public the purchasers of these receivers may never get anything. If they do get anything it will be only a degraded black and white picture. Even for $400,000,000 a year it will not be color.

Even if the Commission at some future time should find (a) that horizontal interlace should be incorporated in the black and white standards, (b) that long persistence phosphors have the performance now claimed for them and that those characteristics should be recognized in those standards, and (c) that a change from 525 lines 60 fields to some other combination of lines and fields is desirable, *those who had bought the bracket standard receivers and paid the additional sums required would not receive an improved picture when the change was made.* Their receivers would have neither the horizontal interlace circuits nor the type of kinescope required to realize the benefits of such changes in the transmission standards. In order to realize those benefits they would have to add the interlace circuits and a kinescope incorporating the long persistence phosphors.

In addition, the foregoing has been premised on the assumption that, in the future, the Commission may change black and white television from 525 lines 60 fields to a different combination of lines and fields. But it may well

be that future experimentation with the effects of horizontal interlace and long persistence phosphors on black and white television will prove that no substantial improvement in picture quality would result from their use on a different combination from 525 lines 60 fields.

[fol. 330] C. Receivers Capable of Operating Under the Proposed Black and White Standards Cannot Be Produced Within the Time Schedule Specified by the Commission.

The Commission has asked manufacturers of television receivers whether they will agree to convert their entire production from the present 525 line 60 field black and white receivers to the bracket standard receivers not later than thirty days after the publication in the Federal Register by the Commission of a final order adopting bracket standards. The Commission's Report contemplates that no hearing will be held with respect to the adoption of bracket black and white standards and that, therefore, if such standards are adopted, they will be adopted early in October. This means that the Commission is asking the manufacturers to agree not to build any receivers other than bracket standard receivers commencing in the early of part of November.

Even assuming that satisfactory production designs of bracket standard receivers arrived at after sufficient design testing were at hand, it would be impossible to get into commercial production of these receivers within the time required by the Commission or any approximation of that time. The preliminary engineering studies of the changes which would have to be made in RCA present production models to comply with the Commission's specifications show that such receivers would have to be completely redesigned, and that bracket standard receivers could not begin to come off the production line before the second quarter of 1951.

In addition there has been no design testing of these bracket standard receivers. RCA feels it cannot gamble [fol. 331] with the public's money and the good will of this company by building and selling receivers incorporating such changes in fundamental design without thorough tests. In view of the nature of the changes required by the Commission's specifications for bracket standard receivers, the

time necessary for the sort of testing that is required before production designs of commercial models can be developed is also considerably longer than that allowed by the Notice.

D. The Manufacture of Bracket Standard Receivers Would Have an Inflationary Effect and Lower the Already Critically Short Supply of Television Receiver Components.

The record in this hearing closed on May 26, 1950, approximately a month before the United States became involved in a war in Korea and before its expanded defense program was commenced. The necessity in the public interest of reducing and resulting strains on the country's economy has since been set forth in the Defense Production Act of 1950.

Among the objectives of this statute is the promotion of the national defense "by preventing undue strains and dislocations upon . . . prices."

The Commission's proposal for the manufacture of bracket standard receivers is, we submit, contrary to this statutory policy. The manufacture of such receivers would have an inflationary effect in that it would increase substantially the cost to the public of every television receiver bought for the indefinite future. It would mean the unnecessary use of critical materials and an unnecessary increase in the price of television receivers.

The action of the Commission would bring about these results on the false assumption implicit in its Report that [fol. 332] a satisfactory compatible system does not exist now and cannot be produced even in the foreseeable future.

Since the start of the Korean conflict, industrial activity has increased substantially, resulting in increased shortages of certain materials and making the procurement of certain television components much more difficult. The additional components which would be needed for bracket standard receivers use iron, steel, copper, nickel, tin and tungsten, all of which have been found by the National Production Authority in its first regulation issued on September 18, 1950 to be in critically short supply.

The television industry already faces difficult and acute problems arising from severe shortages of tubes and components. The manufacture of bracket standard receivers would intensify the difficulties which already exist as a

result of these shortages and would operate to curtail substantially the number of receivers available to the public.

If this were necessary the country would of course have to be subjected to the increased economic strain that it involves. But it is not necessary. This inflationary effect can be avoided and these critical materials saved for the nation's paramount needs by the adoption of a compatible system.

Conclusion

The Commission's action is unique. Never before has an administrative body of the United States undertaken to coerce the freedom of choice of American manufacturers in what they may build and sell under threat that if they do not obey, drastic consequences to the public will follow. [fol. 333] We urge withdrawal from this unprecedented position, not only in respect of its future implications to American business but as well in the interest of 40,000,000 people who are now enjoying television.

Before a final decision is rendered which would degrade the present black and white television service and impose upon the public a scientifically inferior color system, we urge recourse to the opinion of the American people. They are vitally interested. Their voice should be heard.

Radio Corporation of America, (s) C. B. Jolliffe,
Executive Vice President in Charge of RCA Laboratories Division.

September 28, 1950.

[fol. 334]

Annex A

Commission's Report Conflicts With Condon Committee and RCA Progress Reports

The Commission failed to consider matters of great significance which have been fully available to it since the close of the hearings on May 26, 1950. The Commission has closed its eyes to developments taking place after the close of the record, and has written its report as if time had stood still since May 26.

The Commission's failure adequately to inform itself has resulted in fundamental conflict between the Commission's Report and the findings of the Condon Committee

with respect to the technical characteristics of the RCA and CBS color systems. Some of the examples are:

Condon Committee Report	FCC Report
A. "The effectiveness of channel utilization of the RCA color system is the highest of all the systems discussed in this report". (p. 36)	In spite of the Commission's statutory obligation to promote "the more effective" use of the radio spectrum, the Commission's report does not mention the relative effectiveness of channel utilization by the RCA and CBS systems.
B. RCA is the only system which can make use of the mixed highs principle and its use has been conclusively proved to result in a saving of band width. (pp. 18, 38)	The Commission's Report only states that it is "claimed" that the use of mixed highs by the RCA system has saved band width. (Pars. 50, 51) No reference is made to the fact that only the RCA system is able to make use of mixed highs.
C. By the use of dot interlace, an integral part of the RCA system, it is possible to achieve a picture with almost twice as much resolution as is possible on the same band width without dot interlace. (pp. 8-9)	The Commission has found only that RCA "endeavors" to save band space by the process of dot interlace. (Par. 51)
[fol. 335]	
D. Because of the difference between the field repetition rate of the CBS system and the RCA system, the RCA image can be about nine times as bright as the CBS image for equal visibility of large area flicker. (pp. 26-27, 34)	This superiority of the RCA system over the CBS system in freedom from flicker is not mentioned.
E. ". . . no adverse effects are noted from the use of mixed highs." (p. 18)	The so-called "difficulty" which the Commission has stated is encountered by the RCA system in maintaining adequate contrast in small areas is said by the Commission to be due, among other things, to the use of mixed highs. (Par. 76)

Condon Committee Report	FCC Report
F. Fidelity of color reproduction depends upon what primaries are used and there is "no basic difference in the color fidelity of the three color systems". (p. 28)	This fundamental fact is not mentioned in the Commission's Report.
G. "No adverse effect" upon color detail results from the use by RCA of dot interlacing and mixed highs, and in particular the use of mixed highs does not result in "appreciable degradation of the color or tonal values of the image." (pp. 18, 33)	The Commission asserted that because of RCA's use of mixed highs and the way it incorporates horizontal dot interlace, color detail in small areas of the picture cannot be faithfully produced. (Par. 87)
H. "The RCA color image has an over-all resolution approximately equal to that of the black-and-white system". (p. 35)	The Commission found, with respect to the RCA system, that its resolution "even in theory is not equal to that of the present [black and white] system *for all types of scenes.*"* (Par. 91)
I. ". . . the presence of the mixed highs component in the [RCA] color transmission assures high resolution in the black-and-white rendition". (p. 34)	The Commission found that although no change in existing receivers is required in order to enable them to receive black and white pictures from RCA color transmissions, "the picture so received is somewhat inferior to present black and white pictures". (Par. 107)

[fol. 336]

Condon Committee Report	FCC Report
J. "The black-and-white rendition of the RCA color transmission has higher resolution and better flicker-brightness performance" than does the black and white rendition of the CBS color system. (p. 34)	The Commission has implied that the quality of the black and white rendition from the CBS color system on an adapted receiver is as good as the black and white rendition from RCA color transmissions on a standard receiver. (Par. 143)

* Note how this is hedged. The whole statement is limited by the words "for all types of scenes."

The result of the Commission's failure adequately to inform itself is also shown by the statements in the Commission's Report which are wholly inconsistent with the testimony of informed witnesses as to what developments were possible with the RCA system and associated apparatus, and with the statements as to what had already been done in RCA's Progress Report of July 31, 1950. This Progress Report was sent to the Commission a month before the Commission issued its First Report. The following are illustrative:

Evidence in Record	Statement of Accomplished Fact in RCA Progress Report	Commission Statement in First Report
(A) Tri-color tube demonstration on April 6 showed 7 footlamberts brightness. Testimony was that there is "no reason why we cannot have 20, 25, 30" footlamberts brightness or more. (Engstrom, 8158, 10882)	RCA color system receivers utilizing tricolor tubes now produce pictures with highlight brightness of more than 20 footlamberts; and before long brightnesses of 40 to 50 footlamberts will be achieved. (pp. 1-2)	"At none of the demonstrations on the record did any of the RCA color receivers produce sufficient illumination for ordinary home use" and "there is some doubt" whether the RCA system will permit much higher brightness [than 7 footlamberts] on the tricolor tube. (Par. 76)
[fol. 337]		
(B) Dot structure and moire pattern can be eliminated from the RCA picture without any accompanying undesirable effects. (Brown, 10748-54; Engstrom, 8138)	Dot structure and moire pattern have been substantially eliminated due to use of improved receiver circuits and increased number of phosphor dots. (p. 1)	There was no demonstration by RCA of minimizing dot structure and "it appears to the Commission that if the dots are smoothed out, the consequences are likely to be a loss in resolution or contrast, or in both." The RCA tri-color tube "had a serious moire pattern in it". (Pars. 97, 116)
(C) The RCA tricolor tube demonstrated on	The resolution afforded by the tricolor tube has been	"As demonstrated [on April 6], the [RCA tri-color] tube

Evidence in Record	Statement of Accomplished Fact in RCA Progress Report	Commission Statement in First Report
April 6 had 351,000 phosphor dots which resulted in a reduction of resolution. The number of phosphor dots will be doubled. (Engstrom, 7842-43, 7918)	increased because of the increase in the number of phosphor dots from 351,000 to 600,000. (p. 1)	had an inadequate number of dots." (Par. 134)
(D) Receivers will be further simplified and color controls made more stable and less critical (Engstrom, 6094-95; Brown, 8545)	Receivers have now been developed incorporating new simplified and stable circuits. (p. 2)	The receiving equipment utilized by RCA is exceedingly complex and the Commission "is not satisfied that the [tri-color] tube solves the problem of complex receivers". Color controls are critical and not stable. (Pars. 115, 134)
[fol. 338]		
(E) A corrective filter was used at the April 6 demonstration of the RCA tricolor tube because of the inadequacy of the red phosphor. This is a temporary condition. (Engstrom, 8153).	A red phosphor of proper chromaticity has been developed. (p. 1)	The RCA tri-color tube "suffers from the limitations as to color fidelity which are involved in the use of color phosphors rather than filters". (Par. 87)

[fol. 339]

Annex B

Additional Errors in Commission's First Report

There is set forth below a list of some of the other respects in which the Commission's First Report is in error. For the assistance of the Commission, the topical outline used in the Report is followed.

Description of Systems

The First Report of the Commission prefaces its description of the RCA system with the statement that the Commission has found it difficult to describe the RCA system because it involves new and complex techniques. In view of the errors of technical fact regarding the RCA system in the Commission's Report, it is clear that the Commission failed to understand the RCA system.

The statement that the RCA system involves new and complex techniques is misleading. As Dr. Engstrom of RCA testified at the hearing, the RCA system "is based upon several principles for which we have a background of experience. These include the principles of 'mixed-highs' resulting from our simultaneous color research, picture-dot interlacing resulting from our general television research, and sampling and time multiplexing in a restricted frequency band from our radio communications research. Each of these developments goes back one to several years. It is the combination of these which is unique." (2659)

In its description of the RCA system, the Commission found only that it "is claimed" that the use of mixed highs by the RCA system has saved band width. (Pars. 50, 51) [fol. 340] As the Condon Committee found on the basis of the Hazeltine demonstration, there has been "conclusive proof of the efficacy of the mixed-highs technique". (p. 38)

In its description of the RCA system, the Commission has found only that RCA "endeavors" to save band space by the process of dot interlace. (Par. 51) By use of dot interlace and mixed highs it is possible to obtain a picture with almost twice as much resolution as is possible in the same band width without dot interlace.

In describing the RCA system the Commission stated as of some significance that RCA "projection receivers were not exhibited again after the original [October 10, 1949] demonstration" (Par. 53) and in its evaluation of the RCA system the Commission stated that "projection receivers shown at the first demonstration were withdrawn by RCA and not resubmitted". (Par. 115) The statements of the Commission are incorrect. An RCA color projection receiver was again demonstrated at Laurel, Maryland on February 23, 1950.

Evaluation of Systems

In its discussion of the various specific system characteristics, the Commission's Report constantly shifts from apparatus to system considerations. The effect of this shifting is unjustifiably to the advantage of the CBS system. The asserted advantages of the CBS mechanical disc apparatus are found to be advantages of the CBS system; the shortcomings and limitations of such apparatus are not regarded as limitations upon the CBS system since they can be removed by using all-electronic apparatus. Yet [fol. 341] the Commission has failed to attribute to the theoretical all-electronic CBS system those defects which it attributes to all-electronic apparatus and holds against the all-electronic RCA system.

Flicker, Motion Continuity, and Allied Effects

The Commission has omitted the most important and fundamental technical fact with respect to flicker. Because of the difference between the field repetition rate of the CBS system and that of the RCA system, flicker is a more difficult problem for the CBS system. Moreover, the RCA image can be about *nine times as bright* as the CBS image for equal visibility of large area flicker.

The Commission's Report recognizes that if horizontal interlace were utilized in the CBS system to improve its geometric resolution, small area flicker would result. However, the FCC Report goes on to observe that since this is a flicker problem, "tubes with long persistence phosphors *should* minimize the problem." (Par. 67) For the RCA system, however, the Commission Report states only that "it is *possible* that this [small area flicker] effect may be overcome or minimized by the utilization of tubes with long persistence phosphors." (Par. 70) There is no distinction between the two systems in this respect.

The Commission has stated that if long persistence phosphors were successful in reducing small area flicker in the RCA system, the effect of such phosphors "on color fidelity and the portrayal of objects in motion would have to be carefully evaluated." (Par. 70) However, in its appraisal [fol. 342] of the CBS system, when the Commission relies upon the effect of long persistence phosphors to eliminate the CBS large area flicker problem and to reduce small area flicker in the dot interlace version of the CBS system,

there is no such *caveat* as to the effect of long persistence phosphors on color fidelity and the portrayal of objects in motion in the CBS system. There is no distinction between the two systems in this respect.

Brightness—Contrast

The Commission stated that "there is some doubt" as to whether much higher brightnesses than the 7 footlamberts achieved at the first demonstration of the RCA tri-color tube can be obtained when the tri-color tube is used on the RCA system. (Par. 76) As the Commission was informed on July 31, 1950 in the RCA Progress Report, RCA had already by that time achieved tubes with highlight brightnesses of more than 20 footlamberts.

Although the Commission has stated that the brightness of all RCA receivers demonstrated was inadequate (Par. 70), this statement is inconsistent with its request that RCA make available an RCA dichroic mirror receiver "similar to that . . . demonstrated" in order that the Commission could view a CTI demonstration "with relative high brightness and on a direct viewing device." A copy of the Commission's request is attached hereto as Annex E.

The Commission stated that the 20 to 30 footlamberts obtainable on CBS disc receivers was bright enough for use in the home. The Commission overlooked, however, the severe loss in brightness which would occur when existing black and white sets are converted to CBS color. If the [fol. 343] figure of 17 footlamberts highlight brightness for present black and white receivers set forth in footnote 18 of the Commission's Report is taken and in addition the Commission's illustrative figure of 90 percent for loss in light occasioned by the use of the filter disc is used, the result would be that converted receivers would have a highlight brightness of no more than 1.7 footlamberts.

Superposition of Color Images

The Commission has found that the "CBS system is not troubled by other than minor registration problems . . ." (Par. 81) Any advantage enjoyed by CBS with respect to registration is an advantage of the CBS mechanical disc rather than an advantage of the CBS system, but only in a footnote does the Commission recognize that if an all-electronic receiver is substituted for the mechanical disc

receiver the registration problem at the receiver end is identical for the RCA and CBS systems. (Note 23) Not even footnote recognition is given, however, to the fact that if all-electronic apparatus were used in the CBS system at the camera as well as at the receiver, the registration problem is identical for both systems.

Color Fidelity

The Commission has stated that in using its tri-color tube RCA "suffers from the limitations as to color fidelity which are involved in the use of color phosphors rather than filters." (Par. 87) Whatever the difficulties may have been there is now no technical advantage in using color filters rather than color phosphors to produce excellent color fidelity. The green and blue phosphors always emitted light [fol. 344] closely approximating the desired primary colors. More recently, the same result has been accomplished with the red phosphors.

In its evaluation of the RCA and CBS systems with respect to color fidelity, the CBS system is scored high and the RCA system scored low because of the alleged superiority of the color reproduction of the disc apparatus over the color reproduction of all-electronic apparatus. This is an apparatus and not a system matter. No recognition is given to the fact that if RCA tri-color tube receivers are used by CBS to eliminate picture size limitations of the mechanical disc, any color fidelity advantage which it is alleged can be obtained through the use of disc receivers will be eliminated. The ultimate color fidelity obtainable with all-electronic apparatus is superior to that obtainable with disc appartus.

The use of mixed highs in the RCA system does not operate as a limitation on color fidelity. This is confirmed by the experience of the color printing industry. As the Condon Committee noted, detail in color printing is furnished by monochrome just as it is in the RCA system through the use of mixed highs.

Resolution

The Commission has erroneously concluded that the addition of color more than outweighs the loss in geometric resolution in the CBS color system. (Pars. 90, 143) The fact is that good resolution is one of the basic requisites of

a color system. Good geometric resolution is essential to a satisfactory picture and color does not constitute a substitute.

The Commission has stated that "in practice, the RCA resolution has suffered from . . . misregistration". [fol. 345] (Par. 91) Upon the only occasion when there was a check of resolution by members of the Commission's staff, the test pattern readings and the testimony of Mr. Plummer, its Chief Engineer, established that the RCA system successfully achieved the full resolution afforded by the test pattern used—resolution equivalent to that of the standard black and white system.*

Picture Texture (Structural)

The Commission has found that the texture of the RCA picture suffers from visibility of dot structure and "it appears" that if the dots are smoothed out, loss in resolution or contrast is likely to result. (Par. 97) Visible dot structure can be eliminated without appreciably impairing contrast or resolution.

Susceptibility to Interference

The Commission has concluded that the RCA color system "is much more susceptible" to interference than the present black and white system or the CBS color system. (Pars. 101, 136) This alleged susceptibility could exist only when the interference is within plus or minus 1/10 of a megacycle of the sampling frequency. This is unimportant since it can be virtually eliminated by circuit design if experience should show this is necessary.

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* Mr. Plummer's testimony was:

"Q. [By Mr. Heffernan] . . . when you get six separate readings [on the test pattern] that come up to 325, which is the optimum for that kind of a test pattern, is it not fair to infer from that that that is indicative that the [RCA] system can have horizontal resolution of 325 even though certain particular laboratory exemplifications of the apparatus on that day did not all have that figure?"

"A. [By Mr. Plummer] That is right . . ."

Adaptability and Convertibility

The Commission has implied that the black and white pictures produced from the CBS and RCA color systems [fol. 346] are similarly degraded. (Pars. 107, 143) The CBS black and white is degreded, but the black and white picture produced from RCA color transmissions is not degraded. It is of the same high quality as a standard black and white picture.

Equipment Considerations

The Commission's Report implies that the reduction in quality resulting from transmission of CBS color pictures over the coaxial cable is no greater than the degradation in black and white pictures over the cable. (Pars. 1f4, 143) The Commission's Report fails to state that the transmission of a CBS color picture over the coaxial cable imposes degradation on top of degradation. As a result the horizontal resolution of the CBS color transmissions over the coaxial cable is only 37% of standard black and white direct broadcasts. The Commission likewise fails to point out that CBS color signals transmitted over the cable and received on adapted black and white receivers will not have color to compensate, to whatever extent it can, for the 63% loss in resolution.

The Commission's consideration of the use of magnifying lenses in connection with CBS disc-type receivers is unrealistic and unwarranted in view of the lack of public acceptance of magnifying lenses.

The Commission's Report is both wrong and misleading in its treatment of receiver costs. In dealing with the RCA system it refers to RCA testimony of limited significance but fails to refer to significant RCA testimony. The result is to create a false impression with respect to the cost of RCA tri-color tube receivers.

In his testimony Dr. Engstrom used a 16" set as illustrative. He quoted the price of a color set in the way it [fol. 347] would normally be given—including the kinescope. On this basis he said he was sure the price would "stay within the range of 25 to 50% more" than for a 16" monochrome set.

In dealing with CBS-type sets, the Commission refers to the cost of adapters and converters based on estimates which did not take into account the continuously adjustable

bracket standards now proposed for the first time by the Commission. Moreover, in stating an estimate of the cost of a color receiver, the Commission was so unrealistic as to give this for a 7" set—a size which has been obsolete for over two years.

The result is that the Commission has no proper basis for any findings as to cost figures for field sequential receivers of the type now proposed nor of the size now demanded by the public.*

The Commission's statements with respect to the RCA color receiver imply that it is a defect that receivers for the RCA color system must have a band pass of at least 3.6 megacycles, referring to the fact that many of the cheaper receivers today are built with a band pass narrower than 3.6 megacycles. (Par. 117) This cannot be regarded as a defect since, to the extent that receivers do not respond to the full 4 megacycle video signal, a waste of spectrum space results.

Commission's Conclusions

The Commission's Report is contrary to the technical testimony of some of the most eminent engineers in the electronics field. The Commission has assigned as the [fol. 348] reason for its disregard of this testimony the fact that in 1946-47 some of these same engineers supported the RCA simultaneous system. The record in this proceeding is perfectly clear that the color system advocated by RCA is its simultaneous system modified to permit operation in a 6-megacycle channel. The dot sequential aspect is simply part of the means whereby the 3 simultaneous signals are put in a 6-megacycle channel without loss of resolution. In view of this, the fact that these engineers have testified in support of RCA's system in these proceedings is entirely consistent and the Commission's rejection of their testimony is unwarranted.

In rejecting compatibility as a criterion, the Commission stated that it is of the opinion, "based upon a study of the history of *color development* over the past ten years",

---

* As an example of the significance of size, the problems raised by 5(c) of the Commission's Second Notice of September 1 are of an entirely different order in sets with 16" and 19" tubes than they are for sets of 7" and 10", by virtue of the greater deflection angle in the larger tubes.

that from a technical point of view "compatibility . . . is too high a price to put on color". (Par. 123) To the extent that this implies that there has been even the opportunity for development work in color television for the past ten years, it is plainly mistaken. During a large part of that period, work in color television was displaced by the development of wartime applications of the electronic art.

The Commission recognizes that the CBS disc apparatus cannot produce a picture larger than that provided by a 12½ inch tube—the very minimum in public acceptance today—and gives this as one of its reasons for not adopting the CBS system now. But it does not lay down as a criterion the requirement that a color system's apparatus be free from such limitations in respect of picture size.

In its criteria, the Commission does not specify that the color system must not result in degraded resolution and decreased resistance to flicker.

[fol. 349] The Commission has stated that it should not by insisting upon compatibility deprive 40,000,000 American families of color television. There are nowhere near 40,000,000 American families living within range of television transmitters today and in view of the "freeze" and the time required to build additional transmitters; the extra time which may be needed for a compatible color system will not prejudice "40,000,000 American families". The Commission's professed solicitude for the unrealistic "40,000,000 American families" is to be contrasted with its disregard of the 10,000,000 owners of black and white receivers, upon which the whole television broadcasting industry depends.

The Commission has concluded that the RCA system must make use of "exceedingly complex" receivers. (Par. 134) The Commission's unwillingness to find that the RCA tri-color tube eliminates complexity in the RCA receivers rests in part on the fact that the tube "was not demonstrated until late in the proceedings." The RCA tri-color tube was demonstrated on April 6, 1950, and the demonstration by CBS of the effect of long persistence phosphors on flicker did not occur until April 26, 1950. However, the Commission has relied upon the later demonstration of long persistence phosphors in minimizing one of the principal limitations (flicker) upon the CBS color system.

The Commission's conclusion that the RCA receivers are "exceedingly complex" is not correct. In the early part of the hearing Mr. Fink had referred to equipment complexity in the RCA system. In April he testified that this had been eliminated by the RCA tri-color tube. In May Mr. Chapin, Chief of the Laboratories Division of the Federal Communications Commission, said that, on the [fol. 350] point of complexity, the issue was a stand-off between RCA and CBS.

The Commission stated that the RCA tri-color tube as demonstrated on April 6 had an inadequate number of dots. (Par. 134). The tube demonstrated on April 6 had 351,000 dots; the Commission was informed on July 31, 1950 by the RCA Progress Report that the number of dots in the RCA tri-color tubes had already been increased to 600,000.

The Commission has concluded that there is such great difficulty in maintaining the RCA studio and camera equipment in proper operating condition that it is "unlikely that the job could be done by an organization that does not have an extensive staff of research personnel and engineers at its disposal." Operation of the RCA studio and camera equipment does not require unusual engineering or technical skill. The Washington color broadcasts which have been on the air since last January have been carried on by operators from the regular WNBW staff—they have not been research personnel at all.

The substance of the findings of fact and conclusions which should have been made by the Commission on the basis of the record in the hearings on the color television issues are set forth in the proposed Findings of Fact and Conclusions filed by RCA on June 26, 1950. Reference is made to that document and to the RCA Statement in Reply to Proposed Findings of Fact and Conclusions filed by RCA on July 10, 1950 for further instances in which the Commission's Report is arbitrary and capricious and contrary to the evidence.

[fols. 351-352] Annex C

(Report of Condon Committee Follows)

81ST CONGRESS, 2d Session } SENATE { DOCUMENT No. 197

THE PRESENT STATUS OF COLOR TELEVISION

REPORT

OF THE

ADVISORY COMMITTEE ON COLOR TELEVISION

TO THE

COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE UNITED STATES SENATE



PRESENTED BY MR. JOHNSON, OF COLORADO

JULY 14 (legislative day, JULY 1), 1950.—Ordered to be printed, with illustrations

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UNITED STATES SENATE,
COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
May 20, 1949.

Hon. E. U. CONDON,
Director, National Bureau of Standards,
Washington, D. C.

MY DEAR DR. CONDON: The question of the present-day commercial use of color television has been a matter of raging controversy within the radio world for many months. There is a woeful lack of authentic and dependable information on this subject.

Hundreds of applicants for television licenses as well as those now operating television stations are vitally affected by its settlement. The capital investment involved in the installation of a television station runs into a tremendous sum. The operational costs of such a station are extremely high also. All of these expenses must be recovered through advertising. Those who are experienced in advertising believe that if color television were available now, attractive local advertising revenues could be obtained due to the strong consumer demand for it.

The Federal Communications Commission has declined to authorize commercial licensing of color television. It seems reluctant to indicate when and if it will act with respect to authorizing commercial licensing of color. As we understand it, the Commission must first fix minimum standards for color television before licensing can be undertaken, but it refuses to attempt to do so on the premise that color television has not been developed sufficiently for standards to be determined.

Accordingly, it is greatly in the public interest that a sound, factual ascertainment be had now whether or not minimum standards can be fixed today, or in the very near future, so that color television might develop and progress with complete freedom under the stimulus of commercial competition.

One unit in the industry has demonstrated color television 6 megacycles wide and asserts that if the Commission would allocate frequencies and license commercial operation, it could go ahead "tomorrow." Another large unit in the industry also, has demonstrated color television of varying width from 6 to 18 megacycles but believes that color is not yet ready for commercial operation; that much more experimental work must be done and field tests made before commercial licensing should be undertaken. Still another unit in the industry is said to be of the opinion that color television is several years away.

My objective, and the objective of the Senate Committee on Interstate and Foreign Commerce, is to encourage development of the radio art and to press for a Nation-wide, competitive television service in the public interest. Our committee sees television as a great new industry, not only providing new jobs and a new source of wealth but as the greatest medium of entertainment and diffusion of knowledge yet known to man. We believe that it has made great advances

but we are concerned that through delay in opening up the ultra-high frequencies and holding up color until such time as some electronic experts believe that color has reached a state of perfection, a chain of circumstances will have been created which will tend toward monopoly control of the entire television art.

We are anxious, also, to reduce as much as possible any sharp impact on both station licensees and the general public, who already have invested one-half billion dollars in receiver sets, of any sudden but eventually necessary conversion to color. It is our belief that if both potential licensees and the set-buying public are given all of the facts now with respect to color television, less exploitation will ensue and less wasteful expenditures will occur.

Frankly, it seems to us that this is the time to obtain these facts and make them public. The Commission has in effect a "freeze" on further television allocations in the VHF band. It faces the problem of opening up the UHF band in order to provide sufficient channel space for a competitive Nation-wide television system. Now, when there is at least the probability that both bands may be opened simultaneously for allocation, is the time to make certain regarding the color television situation so that, if it is technically feasible, the Commission might also simultaneously open color to commercial licensing in either or both bands.

It has occurred to me, therefore, that at this juncture you could be most helpful in giving this committee sound, impartial, scientific advice. I am anxious that you individually, or in association with a small group of scientific persons of repute, none of whom are employed by or have any connection directly or indirectly with any radio licensee or radio-equipment manufacturer, shall investigate officially this matter for the committee.

Specifically, I would like you and your group to visit the laboratories of the Radio Corp. of America, Columbia Broadcasting System, Du Mont, and any others engaged in color television research and development; confer with their engineers; witness demonstrations; ask questions, all with the purpose of coming to a definite opinion as to the present stage of development of color television. Your inquiries will necessitate an evaluation of present-day practicability of color television: in short, can a satisfactory color television picture be broadcast today in the VHF and UHF frequency bands?

We are aware, of course, that both transmission and reception equipment is not now available on a commercial scale but that is not a controlling factor in whether color television should or should not be licensed, or stations allocated. We are also aware that undoubtedly experience and further experiment will result in the development of a better color picture but that, also, is not a factor in the evaluation we seek. We realize, as you, that color television today is as different from what it will be in perhaps 5 years as were the old crystal radio sets as compared with present-day radio receivers. It is not necessary that the art be fully developed for minimum standards to be outlined.

I am particularly concerned with resolving once and for all the charges that have been made that the advance of color television has been held up by the Commission for reasons difficult for us to understand, and I feel certain that a committee headed by so eminent a scientist as you will help resolve these doubts and questions which have been tossed about.

You will want, I assume, to confer with the engineers and laboratory personnel of the Federal Communications Commission as well as with the people in the industry. I feel certain that you will have the cooperation and willing assistance of the responsible officials of the industry in such a study, and I shall be pleased to ask them and any Government agencies who may be concerned to accord you and your group every assistance and cooperation.

I sincerely hope in the public interest that you will assume this difficult assignment. I shall be pleased to confer with you at your convenience.

Sincerely yours,

ED. C. JOHNSON, *Chairman.*

THE PRESENT STATUS OF COLOR TELEVISION

CHAPTER 1

SCOPE OF THE INVESTIGATION AND SOME BASIC CONCLUSIONS

1. Introduction

This report has been prepared at the request of the chairman of the Senate Committee on Interstate and Foreign Commerce. It represents an independent appraisal of the present status of color television in the United States and takes into account observations of the black-and-white television service now offered to the public as well as demonstrations of three color-television systems proposed for public use by Color Television, Inc., the Columbia Broadcasting System, and the Radio Corp. of America. The report is confined to technical factors, expressed so far as possible in nontechnical terms.

The report is organized as follows: Chapter 1 outlines the activity of the committee, describes the approach of the committee to its assignment, and sets forth some basic conclusions. Chapter 2 analyzes color-television service in general and lists the apparatus and performance characteristics by which competing color systems should be judged. Chapters 3, 4, and 5 describe, respectively, the three proposed color systems, in alphabetical order, viz, those of Color Television, Inc. the Columbia Broadcasting System, and the Radio Corp. of America. These chapters state the actual and potential performance of the systems, in terms of the characteristics listed in chapter 2. Chapter 6 consists of a comparison of the three color systems and the black-and-white system, and includes a tabular tally sheet on which the systems may be judged.

No recommendation for the adoption of a specific system is given, since the committee believes that the decision to adopt a system must include consideration of many social and economic factors not properly the concern of the technical analyst. It is hoped that the report will provide a comprehensive and understandable basis on which the technical factors may be considered in arriving at a decision.

2. Narrative of the committee activity

The Senate Advisory Committee on Color Television was appointed in June 1949 by its chairman, Dr. E. U. Condon, the Director of the National Bureau of Standards, in response to a request by Senator Edwin C. Johnson of Colorado, chairman of the Senate Committee on Interstate and Foreign Commerce. The letter from Senator Johnson to Dr. Condon requesting the investigation, dated May 20, 1949, precedes this report.

On May 26, 1949, the Federal Communications Commission announced that, at a hearing to be convened to consider expansion of the commercial television service, evidence would be taken concern-

ing the possibility of instituting a public color-television service. Excerpts from the FCC Public Notice No. 49-948 relating to the color-television aspects of this hearing are appended as annex A.

Meetings of the Senate advisory committee (hereinafter referred to as "the committee") were held August 3, 17-19, October 7-10, November 21-22, 1949, January 19, 20, February 1, 20, 23, March 11, 14, April 26, May 22, July 5, 6, 1950. During these meetings, demonstrations of color television were attended by two or more members of the committee as follows: CTI system, February 20, 23, March 14, 1950; CBS system October 6-10, November 21-22, 1949, January 20, February 1, 23, April 26, 1950; RCA system, October 6-10, November 21-22, 1949, January 19, 23, 1950; Hazeltine demonstration, May 22, 1950. These demonstrations included the comparative demonstrations of the color systems before the FCC held November 21-22, 1949 and February 23, 1950, at which all members of the committee, or designated alternates, were present.

At its meeting of November 21, 1949, the committee discussed the question of the basic terms of reference of the report, particularly regarding the availability of additional channels not then contemplated by the FCC proposals. As a result of this discussion, an inquiry was prepared and forwarded to Senator Johnson as of February 2, 1950. A copy of this inquiry is appended hereto as annex B.

Shortly thereafter, the formation of the President's Communications Policy Board was announced. In view of the contemplated activity of this Board, Senator Johnson advised the committee to proceed within the terms of reference proposed by the FCC, namely, to consider channels in the very-high-frequency (VHF) band from 54-88 and 174-216 megacycles, and channels in the ultra-high-frequency (UHF) band from 475 to 890 megacycles. Senator Johnson's reply is appended as annex C.

At its meeting of March 11, 1950, the committee met with Senator Johnson and discussed matters pertinent to the report. The final report, approved unanimously at the meeting of the committee, July 5-6, 1950, is presented herewith.

3. Terms of reference of the report

(a) The 6-megacycle radio-frequency channel.—This report is concerned only with color-television systems intended for a 6-megacycle radio-frequency channel; that is, a channel equal in width to that now assigned to black-and-white stations. Since color systems of superior performance have been demonstrated using channels wider than 6 megacycles, the justification for confining this report to the 6-megacycle channel is stated at the outset.

As shown in greater detail in chapter 2, the choice of the channel width in a television system is necessarily a compromise between quality and quantity; quality of the reproduced television image on the one hand and quantity of television service on the other.

If the radio channel width were doubled, a clearly perceptible improvement in the quality of the image should be apparent, but the number of channels available would be halved, thereby greatly reducing the possible number of stations.

Moreover, as the width of the channel is progressively increased, the corresponding improvement in picture quality apparent to the observer under normal viewing conditions becomes less pronounced. There is, in other words, a law of diminishing returns that ultimately

affects the attempt to improve image quality by increasing the width of the channel. On the other hand, no such diminishing law affects the relation between channel width and the number of channels. Each time the channel width is doubled, the number of channels is halved, and this law holds without diminution as the channel width is increased.

Evidently a point is reached, as wider channels are considered, at which the slight improvement in image quality afforded by a substantial increase in channel width is not worth the reduction of service that would be entailed. The optimum channel width must be chosen, therefore, by a body qualified to judge that combination of quality of image and quantity of service which best serves the public interest.

This judgment has been entrusted by statute to the Federal Communications Commission, which established the 6-megacycle channel for black-and-white television as early as 1937. This channel width provides an image quality roughly comparable to that of 16-millimeter home motion pictures, and allows 12 channels to be assigned in the very-high-frequency spectrum, due account having been taken of the needs of other services.

When a color-television service is considered, the optimum compromise between quality and quantity, similarly determined as meeting the public interest, does not necessarily lead to the same value of channel width. In fact, the addition of color to the image brings about a degradation of certain other qualities in the image (particularly pictorial detail and freedom from flicker, see ch. 2) when the channel width is unchanged. To avoid degradation of these qualities in the color image, a wider channel must be assigned.

In the face of this fact, a mitigating circumstance has appeared, in the form of a new development (known as dot interlace, explained in ch. 2) which is capable of substantially improving the pictorial detail of the television image, without requiring any increase in the width of the channel.

Specifically, when dot interlace is adopted in a color-television system, the technique can provide a color image whose pictorial detail is substantially equal to that of the black-and-white images currently rendered to the public. This fact implies that color service, capable of being rendered on a 6-megacycle channel, may achieve a quality generally as satisfactory as that of current black-and-white broadcasts.

Another factor affecting the choice of channel widths is an economic one, relating to the investment by the public in black-and-white television receivers when color television is first offered as a regular public service. If the investment is substantial, when compared to the ultimate per capita investment to be expected in the then foreseeable future, it is desirable that after any change or extension of the television service, the service can be used with then-existing receivers with a minimum of expense, inconvenience, and/or degradation of the quality or quantity of the service. If the new service operates on channels wider than 6 megacycles, existing receivers cannot use the new service.

Based on the foregoing analysis, the committee concludes that the allocation of 6-megacycle radio-frequency channels for color television is the proper compromise between the quality and the quantity of the color service.

(b) *Comprehensive nature of systems considered.*—In restricting its consideration to three color-television systems, the committee is aware that certain other systems, known to the members, might have been considered. The report is confined to these three systems, not merely because they are the ones actively proposed at present, but rather because they comprise, as a group, all of the basic types of sequential color systems.

Television images, as outlined in greater detail in chapter 2, consist of picture elements (dots) arranged along lines, the lines being assembled to cover the field (the picture area). A succession of fields is transmitted to create the illusion of continuity and motion in the image. The dot, the line, and the field are then the three basic elements of a television picture. No matter how the picture is analyzed in the television camera or synthesized at the receiver screen, the process of transmission can always be described in terms of these three elements.

It is most fortunate, therefore, that the systems of color television actively proposed are based respectively on these three attributes of the image. The RCA system is a dot system, since the color is assigned to successive picture elements, or dots, of the image. In the CTI system, a line system, the color is assigned to successive lines of the image. The CBS system is a field system, the color values being assigned to successive fields of the image. Other color systems (notably the simultaneous system developed in 1946 by RCA but discontinued in favor of the dot system) are known, but they are difficult, if not impossible, to adapt to a six-megacycle channel.

> If, therefore, only six-megacycle systems are to be considered, the committee concludes that the color television system ultimately adopted must be either a dot-sequential system, a line-sequential system, or a field-sequential system. No other methods need be considered, in the light of present or foreseeable technical developments.

(c) *Mutually exclusive nature of the color systems.*—Because the three color systems herein discussed are based on fundamentally different aspects of the television image, they are to a very large extent mutually exclusive, so far as public service is concerned. All use the 6-megacycle channels, and in many other respects are similar (each uses the same type of sound system, for example). Each, however, is fundamentally different from the others in the way in which the color values are distributed among the dots, lines, and fields of the image, and this difference is so profound that the receivers for one system cannot be converted to another except at considerable expense.

At the present stage of the art, a universal receiver, capable of receiving transmissions of all three types, would represent three separate receivers in a single cabinet, with certain elements in common. Changing the connections of the common elements, to convert from the dot-system to the line-system or to the field-system of reception, would involve a highly complicated and vulnerable mechanism. Moreover, the compromises inherent in the design of such a universal receiver would most certainly impair the performance of at least one system and perhaps of all three systems.

Past experience, notably in Great Britain in 1936, with multiple standards of television transmission has proved that such action encourages a portion of the viewing public to purchase equipment which

loses its value when the final decision is made among the multiple standards. The decision can be made, and should be made, on the basis of analyses and tests conducted prior to the inauguration of the public service. Moreover, these analyses and tests are well under way, and the final decision can be made without unwarranted delay. But any authorization of color-television transmission on a multiple-standards basis is a guaranty of confusion that may well impose a much greater delay in the development of the color-television service.

The committee concludes that one and only one of these systems should be licensed for service to the public and that therefore the decision among the dot-, line-, and field-systems must be made in advance of the introduction of a color television service.

4. Summary

In summary, the committee bases this report on the following basic conclusion:

1. A 6-megacycle radio-frequency channel is adequate for color-television service and represents a proper compromise between quality and quantity of service.

2. The three systems of color television herein described comprise all of the basic systems of color television which need be considered for a 6-megacycle channel.

3. The three systems are mutually exclusive. One, and only one, of these systems must be chosen in advance of the inauguration of a public color television service.

CHAPTER 2

COLOR TELEVISION PRINCIPLES

5. Natural vision versus television

In natural vision, the scene before the observer is focused on the retina of the eye, which contains millions of tiny light sensitive elements, all of which are continuously exposed. These retinal elements are connected to the optic nerve, which comprises hundreds of thousands of separate fibers, each of which is capable of carrying a part of the visual impression to the brain. In this manner all parts of the scene are apprehended simultaneously.

When an artificial medium, such as motion pictures or television, is interposed between the scene and the eye, it is not practicable to imitate the continuous nature of the actual scene. Rather, it is necessary to present to the viewer a rapid succession of still pictures, each differing very slightly from the ones preceding and following it. In motion pictures, this is done by printing a succession of pictures on a strip of film and passing the film through a projector. Each picture on a movie film is a comprehensive still picture of the whole scene. In motion pictures, therefore, the camera apprehends the whole scene at once, but it does so in discontinuous fashion, one still picture at a time.

In television, a similar succession of still pictures is transmitted, but it is not practicable to transmit the whole area of each still picture at once. This would require hundreds of thousands of separate cable or radio circuits, corresponding to the hundreds of thousands of separate fibers in the optic nerve. Any channel of an electrical communication system using telephone lines or radio waves can transmit

only one thing at a time. Therefore the picture must be analyzed into a finite number of picture elements whose light intensity must be converted into signals one after the other, sent over the communication channel, and reassembled on the viewing screen in the proper position, all within the time normally used in a motion picture for showing one frame. The number of picture elements which must be distinguished in television is dependent upon the detail desired.

If the processes of dissecting and reassembling are carried out very rapidly the whole receiver screen appears to be illuminated simultaneously.

6. Television scanning: "Reading" the content of the scene

Television images are dissected and reassembled by a process known as "scanning," a term which arises from the similarity of the process to the action of the eye in scanning pages of printed matter. The eye reads from left to right along the first line of type, then returns rapidly to the beginning of the next line, scans it, and so on until the bottom of the page is reached. The page is then turned, and the process is repeated on the next page.

In a televised scene, corresponding to the individual letters of print are rapid or gradual variations in light and shade, depending upon the nature of the scene. These variations are arranged in horizontal lines, like lines of print, and the lines are arranged parallel to one another, filling the picture area. In the television camera the variations along the uppermost line are explored rapidly from left to right, and signals are generated which correspond to the degree of light or shade along the line. When the first line is thus scanned, another line below the first is similarly covered, and so on, until the bottom of the picture is reached. In a communication system the signal cannot change abruptly from one value to another, and the shortest distance along the line which can be made to change from white to black is called a picture element. The shorter this distance the greater is the detail which can be transmitted, but the greater are the requirements on the system, particularly the wider is the band width which must be allocated to the communication channel. In some cases these picture elements may be made up of dots definitely located along the lines, but in the present black and white system variations may start or stop at any point and no dot structure is observable, although the line structure always is. However, for purposes of explanation these picture elements will be generally referred to as dots.

Like the lines of print in a double-spaced typewritten page, each line of elements is separated from the line above it and the line below it by a blank space of the same height as the line. The blank spaces are filled in during the next successive scanning of the picture area. The two sets of lines are thus "interlaced" one within the other. As these two sets of lines are scanned, all of the light and shade values, over the whole area of the picture, are translated into a succession of electrical counterparts. The picture is scanned in two sets of interlaced lines, rather than in one set of consecutive lines, in order to minimize flicker in the image. This is explained in section 8.

At the receiver, a spot of light moves across the picture screen in the same scanning motion. Acting under the control of the broadcast station, the spot changes in brightness as it moves along each line

and thus re-creates the light and shadows of the original scene. Since the light spot on the viewing screen moves in precise step with the scanning process at the television camera, each dot of light falls in its proper place, and has its proper value of light or shade.

This description of scanning shows how important it is that the operation of the television system be standardized. Once the number of lines and the number of pictures per second have been established it is essential that all receivers be capable of operating with that number of lines and that number of pictures per second. Any change in the scanning standards adopted for the transmitter thus requires an exactly equivalent change in the scanning process at each of the many millions of receivers in the hands of the public.

7. Pictorial detail: How many dots in the picture?

The choice of scanning standards starts with this basic question: How many dots are required in the whole picture area to reproduce a picture of acceptable quality?

If there were no economic limitations, and if the radio spectrum was limitless, it might be desirable to transmit a picture containing many millions of dots. Thus an 8-by-10-inch printed photoengraving of the highest quality (150-line-per-inch halftone, printed on high-gloss paper), contains about 2,000,000 dots. Such a picture can be examined closely by the unaided eye, without the dots themselves becoming separately visible.

In television and motion pictures, it is not necessary to examine the picture minutely. When a performance is to be viewed continuously for many minutes or hours, in fact, it is necessary that the whole picture area be contained within such a field of view as to avoid excessive movement of the neck or eyes. For example, most people find it uncomfortable and fatiguing to view continuously a picture 1 foot high from a distance less than 3 feet. This ratio of viewing distance to picture height applies equally well with other picture sizes; i. e., the minimum viewing distance, to avoid excessive fatigue, is generally taken to be three times the height of the picture. Many individuals cannot look for long periods at a picture unless it is viewed from a considerably greater distance than this, say five to eight times the picture height. These points are indicated by the location of the seats chosen in a motion-picture theater by patrons who have a free choice.

When the image is to be viewed at a distance greater than three times the picture height a pictorial detail of several hundred thousand dots suffices, as against the millions of dots that would be required for closer inspection. If a larger number of dots were used, the excess would be wasted since the eye cannot perceive the additional detail from a distance.

This limit on required detail has led to the choice of various sizes of motion-picture film. Professional 35-millimeter film, as commonly projected in motion-picture theaters, has a pictorial detail equivalent to about 1,000,000 halftone dots. The 16-millimeter movie film, used by the advanced amateur, has the equivalent of 250,000 halftone dots in the picture area, when film and projector are in first-class shape. The average performance of 16-millimeter home-movie film and projectors is such, however, that the effective pictorial detail seldom exceeds the equivalent of 200,000 dots. The smallest movie

film currently used is the 8-millimeter size. This film has the equivalent of about 50,000 halftone dots in the picture area.

The pictorial detail offered by various motion-picture systems, professional and amateur, is a compromise. The upper limit is set by the cost of film and processing, cameras, and projectors. The lower limit is set by the reactions of the viewer, who objects to an image having so little detail that it is incapable of portraying a wide variety of subjects satisfactorily. All those who have viewed 16-millimeter and 8-millimeter movies of the same subject matter are well aware of the greater sharpness of the larger film. In payment for the superior performance of the 16-millimeter system, approximately four times as much money must be paid for film and processing for a given period of viewing time, relative to the 8-millimeter type. Accordingly, economic factors have given the 8-millimeter film a commanding position in the amateur-film market. At the other end of the scale, movie theaters employ virtually nothing but 35-millimeter film to meet the high standard required for elaborate and expensive productions.

In television, a similar compromise must be found, since it is expensive to set up a television system having too much detail in the image. The expense resides not only in the extra cost of transmitting and receiving equipment but also in the extra space occupied by the television channels in the radio spectrum. In a given portion of the spectrum, for example, the number of channels which can be accommodated varies in inverse proportion to the number of picture elements in the image, all other factors remaining unchanged. Thus a change from a television system approximately equivalent to 16-millimeter home movies (200,000 dots) to one equivalent to 35-millimeter professional movies (1,000,000 dots), would force a reduction in the number of channels in the ratio of 5 to 1. For the sake of completeness, it should be mentioned that, on the basis of geometrical resolution alone, a 200,000-dot motion-picture system would be superior to a 200,000-dot television system, because the line structure is not present in the motion picture.

Faced by this conflict between quality (pictorial detail) on the one hand, and quantity (number of stations and choice of programs) on the other, the Federal Communications Commission in 1941 adopted for public television broadcasting a black-and-white system having about the equivalent of 200,000 halftone dots in the picture area. This choice appears to have merit, because it follows the standard of the best visual medium of entertainment hitherto used in homes, the 16-millimeter home-movie system. More fundamentally the 200,000-dot television system permits the picture to be viewed at a distance as close as four times the picture height, without the picture structure's becoming too evident. This viewing distance is close to the minimum value of three times the picture height, set by the fatigue factors previously discussed.

When it is decided that the television picture should be equivalent to 200,000 halftone dots, it is necessary to select the number of lines and the number of dots per line. This is not a critical matter. For example, a picture of 400 lines, each having 500 dots, would provide a 200,000-dot picture ($200{,}000 = 400 \times 500$). A picture having 500 lines, each containing 400 dots, would serve equally well. The present black-and-white system employs 525 lines, about 490 of which are

actually visible on the screen, and each line has the equivalent of about 420 dots along its length. As previously stated, the 490 visible lines are actually scanned in two sets of 245 lines each, one set interlaced within the other.

Experience with the 525-line black-and-white system since 1941 has shown that it provides an adequate basis for a public television service, so far as pictorial detail is concerned. But this is not to imply that additional detail would not be desirable if it were available without excessively reducing the quantity of service. For this reason, the introduction of dot interlace to the black-and-white system is being considered. This recently developed technique would increase the pictorial detail of the black-and-white image from 200,000 dots to something over 350,000 dots, without any increase in channel width.

Before leaving the question of pictorial detail, it must be emphasized that this aspect of television-system performance is capable of a considerable degree of misinterpretation in comparing the merits of different proposals. The difficulty arises from the various types of subject matter which may be portrayed by television.

When a scene is viewed in a close-up shot, as for example when the face of a performer fills the whole screen, not much pictorial detail is required. To show the essential features and details of a face it is not necessary to use more than 50,000 dots, as experience with the 8-millimeter movie system has amply demonstrated. When, however, it is desired to show the whole area of a baseball diamond, or some other equally extensive subject, the requirement for pictorial detail is very much larger. In fact 200,000 picture elements may then be insufficient to show more than the bare outline of the individual players.

Since a television system is called upon to depict both close-ups and long shots, sufficient pictorial detail must be provided to take care of the long shots, despite the fact that a large part of the detail is wasted when close-up shots are being transmitted. A test of a television system which comprises only close-up shots does not reveal the pictorial-detail limit of the system. Such tests must show the whole range of subject matter for which the television system is intended.

Since the appreciation of pictorial detail is a highly individual reaction of the viewer, it is unlikely that complete agreement on this aspect of system performance will be reached by all participants in a test. But it is possible to state categorically the effect of pictorial detail in the following terms:

Consider a subject viewed in a close-up shot, and suppose that the camera moves back from the subject so that the close-up shot gradually becomes a medium-length shot and finally a long shot. At some point, as the camera recedes from the subject, a given viewer will find that the pictorial detail becomes inadequate and the portrayal is unsatisfactory. This is the point at which the pictorial detail of the image becomes the limiting factor, for that particular observer.

If now the picture detail in the television image is increased, the area viewed by the camera can be increased in the same proportion, without exceeding the critical limit set by that observer. Suppose, for example, that the number of dots is increased four times, from 50,000 to 200,000. Then the camera can take into view an area four

times as great, with the same degree of visual satisfaction. In concrete terms, if the face of one actor can be shown, with a given degree of satisfaction, on a screen of 50,000 dots, four actors can be shown with the same degree of satisfaction with a screen of 200,000 dots; if the action covering 1,000 square feet of a basketball court is portrayed satisfactorily with a 50,000-dot image, action covering 4,000 square feet may be portrayed with the same satisfaction with 200,000 dots.

Any limitation in the detail of the television image constitutes, therefore, a limitation on the program director with respect to the area which he can pick up with a given degree of satisfaction. If the pictorial detail is low, say, 50,000 dots, the cameraman must use close-up shots almost exclusively; whereas if 200,000 dots were available, medium shots could be used with the same degree of satisfaction. Finally, if very high detail were available, say a million or more dots, long shots would display the same degree of visual distinction as medium shots and close-ups.

It follows that the flexibility with which the program director can use lenses and cameras is intimately tied up with the detail provided in the image, and any restriction on pictorial detail implies a restriction on the use of the camera. It is true that this restriction can be circumvented in many types of programs by rapid switching from camera to camera, each showing a close-up shot. In athletic contests and other large-scale presentations, however, the restriction on viewing angles may prevent the viewer from following the over-all aspect of the action. This limitation is clearly evident in telecasts of football and hockey, but is much less noticeable in the confined arena of a boxing or wrestling match.

The technical term for pictorial detail is "resolution," because this quantity represents the ability of the television image to resolve the fine details of the scenes it depicts. As we have seen, resolution is measured by the total number of equivalent halftone dots in the image. The number of equivalent dots along each line (conventionally measured as the number of dots in a distance equal to the picture height) is the "horizontal resolution." The number of dots resolved at right angles to the lines is known as the "vertical resolution." As outlined in the following chapters of this report, resolution, measured in the horizontal and vertical directions, is one of the basic criteria by which the proposed color-television systems must be compared.

8. Image continuity: How many pictures must be transmitted per second?

The second question in the choice of scanning standards is the number of complete pictures to be sent per second. In considering this question it is necessary to have clearly in mind the meaning of the terms "field" and "frame." In section 6 it was pointed out that the television image is scanned in two sets of lines, one interlaced within the other. One set of these lines, having blank spaces between lines, is known as a field. The lines of one field cover only one-half the area of the picture. The other half of the area (the space between the lines) is filled in by the lines of the next successively scanned field. Hence all points in the picture have been covered when two successive fields have been scanned. Two successive fields, comprising all the lines in the image, are known as a frame.

To insure continuity in the motion of the image, it is necessary that the fields succeed one another at a rapid rate. If the fields are presented at a rate slower than about 15 per second, the apparent motion in the image will be disjointed or "jerky." This corresponds to running a motion picture film through a projector at too slow a speed.

In practice the rate of scanning the successive fields must be much higher than this minimum value of 15 per second, because of another effect known as flicker. Flicker appears because the light on the screen is cut off between the successive pictures. If the rate of scanning successive fields is too low, the light on the screen will appear to blink on and off in a manner which is annoying to watch and induces severe visual fatigue. If the successive fields are scanned at a sufficiently rapid rate, however, the sensation from one picture persists throughout the dark interval between fields and the screen appears as if it were continuously illuminated.

The brighter the television image, the more perceptible is the flicker. Hence, in deciding how many fields must be scanned each second, it is necessary to decide how bright the picture must be, and then choose a field rate high enough to avoid flicker at that level of brightness.

Different compromises have been adopted in this respect in different countries. In Great Britain, the pictures are scanned at a rate of 50 fields per second, whereas in the United States, in the black-and-white system, they are scanned at 60 fields per second. The brightness at which flicker is perceptible goes up very much faster than the increase in field rates, with the result that the American rate of 60 per second permits pictures to be about 6 times as bright as the British pictures. In consequence, British receivers must be viewed in a darkened room, whereas most American receivers can be viewed satisfactorily in rooms illuminated by direct daylight.

Two types of flicker must be distinguished in comparing the performance of color television systems. The first is "large-area flicker", which applies to the whole area of the image, or to any bright part of the image occupying a substantial portion of the field of view. The more closely the image is viewed, the larger is the portion of the field of view occupied by the bright portions of the image, and the more noticeable is the large-area flicker effect.

The second type of flicker, known as small-area flicker, appears in areas having the size of a few picture elements or the width of a few scanning lines. This type of flicker is most noticeable on close inspection of the image, but it may be apparent at normal viewing distances under certain conditions.

One form of small-area flicker applies to individual scanning lines. We have noted that each picture is scanned successively in two sets of lines, one set interlaced within the other. Hence any one line in the image is illuminated only half of the time, and the flicker rate which applies to a single line is accordingly half that applying to the image as a whole. This low flicker rate gives rise to the so-called "interline flicker" and "line crawl". Interline flicker manifests itself as a blinking of thin horizontal lines in the image, such as the roof line of a house. Line crawl is an apparent motion of the lines upward or downward through the image, due to the successive illumination of adjacent lines in the picture, particularly in bright parts of the image.

Flicker can be controlled either by dimming the image or by increasing the rate at which the successive fields are scanned. Both methods of flicker control are subject to severe limitations. If the image is dimmed too far, the fine detail in the image cannot be perceived by the eye, and eyestrain results. Also, even at considerably brighter levels than the eyestrain limit, it is necessary to darken the room to secure accurate rendition of all the shades of gray (in a black-and-white picture) or all the saturations of color (in a color picture). On the other hand, if the picture-scanning rate is raised too high, the spectrum space required by the signal becomes exorbitant, as explained in section 10, below. The choice is essentially a compromise. Experience has shown that rates between 48 and 60 fields per second are required to produce flicker-free pictures of adequate brightness.

In passing, it should be noted that the picture-scanning rate is sometimes expressed in frames per second. Since a frame contains two scanning fields, the frame rate is one-half the field rate. Thus the 60-field-per-second rate of the American black-and-white system may also be stated as 30 frames per second. The most useful term, applicable to both black-and-white and color systems, is the rate in fields per second, and this term is used in this report unless specifically stated otherwise.

9. Channel width: How many megacycles for a television station?

The channel width required by a television station is determined directly by the scanning specifications described in the preceding paragraphs; namely, the number of equivalent dots per picture and the number of fields transmitted per second.

The relationship between these quantities can be traced as follows: From section 7 we recall that the standard black-and-white picture corresponds to about 200,000 dots, and that these dots are distributed in two sets of interlaced lines. One set of the interlaced lines (one field) thus encompasses about 100,000 dots. From section 8, we recall that the fields are transmitted one after the other at a rate of 60 per second. Nominally, then, 100,000 dots must be transmitted in one-sixtieth of a second. Actually, since a portion of the lines is not visible in the picture the time available is about one-eightieth of a second. Consequently, the rate of transmitting dots (100,000 of them in one-eightieth of a second) is about 80 times 100,000 or 8,000,000 dots per second.

To transmit picture dots at a rate of 8,000,000 a second, it is necessary to employ a channel width of at least 4,000,000 cycles per second (4 megacycles). This band width of 4 megacycles is required for the picture alone and is referred to as the video channel. In addition to this 4-megacycle minimum requirement, channel space of about 0.2 megacycle must be allowed for the sound transmission, and additional space must be allowed to prevent mutual interference between the picture and sound signals of the station. Finally, a substantial amount of additional space (about 25 percent) must be allowed to permit proper operation of the television transmitter and receiver (to permit "vestigial side-band" operation). When all these requirements are added, the radio-frequency channel width required for transmitting picture dots at a rate of 8,000,000 per second, plus associated sound, is 6 megacycles.

The foregoing discussion shows that the channel width is determined fundamentally by the number of picture elements (dots) in each field multiplied by the number of fields transmitted per second. If the number of dots were increased from 200,000 to 400,000 per picture, the channel width would have to be doubled. Similarly if the number of fields per second were increased from 60 per second to 120 per second, the channel width would have to be doubled. If both the number of dots and the number of fields per second were doubled, the channel width would have to be quadrupled.

When the channel width is fixed at 6 megacycles, as is assumed throughout this report, and in the absence of dot interlace, the number of dots can be increased above the 200,000-dot limit only if the number of fields per second is correspondingly reduced below the 60-per-second figure. Alternatively, the number of fields per second can be increased only if the number of dots is proportionately decreased.

The dots represent pictorial detail, and the field rate determines the brightness at which flicker becomes apparent. Hence pictorial detail can be increased only at the risk of incurring flicker, and flicker can be controlled only by incurring a loss in pictorial detail, once the channel width and picture brightness have been decided upon.

The conflict between pictorial detail and flicker has occupied the center of the stage in television development for many years. One result of this conflict is the division of the lines in a television picture into two groups, one interlaced within the other. This technique of "line interlace" was developed as early as 1934 to reduce flicker while maintaining the pictorial detail at a satisfactory level. In line interlacing, the area of the image is illuminated twice while the pictorial detail (200,000 dots) is laid down only once. While interlacing introduces interline flicker and similar small-area defects, these faults are worth accepting in favor of the general reduction of flicker, and the permissible brightening of the picture.

Much more recently (first announced publicly in 1949), an extension of this principle known as "dot interlace" was developed. In dot interlace, the picture elements along each line are arranged with blank spaces between them. In other words, they are actual dots, and the blanks are filled with dots on the next scanning of that line. When added to the line interlace just discussed, the dot-interlace system permits the area of the picture to be illuminated four times while the pictorial detail is laid down once. When the frequency of illumination is maintained at 60 fields per second, dot interlace plus line interlace thus permits all the pictorial detail to be laid down in one-fifteenth second (actually about one-twentieth second when the blanked-off portions of the lines are taken into account). Dot interlace therefore permits 400,000 dots to be accommodated in the picture as contrasted with 200,000 dots when only line interlace is used.

10. Color reproduction: The role of primary colors

The addition of color values to a television picture involves the reproduction of the thousands of different colors which the eye can distinguish. This seemingly formidable task is vastly simplified by the fact, established in Newton's time, that all colors can be very closely represented by combining just three colors, known as primary colors.

There are two types of primary colors. When the reproduction is effected with layers of colored material, one on top of another, through

which light must pass in succession, the so-called "subtractive primaries" must be used to obtain a satisfactory range of mixture colors. The subtractive primaries are red, blue, and yellow. These are the familiar primary paint colors known to students in elementary school. Subtractive primaries are used in oil and water-color paintings, in color printing, and in color photography (prints and transparencies). In color printing and photography, the primary colors used are a bluish red ("magenta"), a greenish blue ("cyan") and a greenish yellow. These subtractive primaries are the ones most commonly known to the public.

In color television, the reproduction is not effected with layers of colored material one over the other, but rather consists of individual lights of the primary colors presented one after the other in time sequence. For this type of color reproduction, the so-called "additive primaries" must be used. The additive primaries are red, blue, and green. If pieces of red glass and green glass are placed one beside the other (not one on top of the other) and white light is passed through them in such a manner that the red and green light thus formed falls on the same area of a viewing screen, the combined light will have a yellow color. If red, green, and blue glasses are similarly employed, the combined light on the screen will appear white, or near white.

With these primaries combined in proper proportions it is possible to reproduce any of the hues of the visible spectrum, plus purples which do not appear in the spectrum, plus all the shades of gray from white to black, as well as mixtures of the above. With only three primary colors it is not possible to reproduce all the spectrum colors exactly, but the color match can be made so close that only simultaneous inspection of the original color and the reproduction will reveal the difference. Experience with various types of color photography has shown, in fact, that a highly realistic rendition of natural colors can be achieved with three properly chosen primaries.

When only two primary colors are used, the rendition is very much less realistic. The primaries customarily used in the two-color process are a red-orange and a green-blue. With these, it is not possible to reproduce a pure (saturated) red, a pure blue, a pure yellow, or a pure green. Some improvements have been obtained by making the two primary colors change with brightness, but even so a system of such limitations cannot properly reproduce the colors in nature. For this reason, two-color processes have not been widely employed in motion pictures, nor have they been proposed for public color-television service. All of the color-television systems discussed in this report use the three additive primary colors, red, green, and blue.

Since at least three primary colors must be used to achieve realistic color reproduction, it follows that three color images must be transmitted by a color-television system. The three color images are transmitted in sequence, hence the name "sequential color television system." In the dot-sequential system, the primary colors are assigned to successive dots of the image. In the line-sequential system, the primary colors are assigned to successive lines of the image. In the field-sequential system, the colors are assigned to successive fields of the image.

The manner in which the colors are interspersed is discussed in detail in the following chapters relating to the three systems. Here it suffices to say that three separate images, one in each of the primary

colors, must be dissected in a particular sequence at the transmitter and reassembled in the same sequence at the receiver. The dissecting and reassembling processes are performed so rapidly that the primary colors are not separately perceived one after the other, but appear to the observer to blend or "fuse," as though they existed simultaneously.

Thus, while it is true that only one primary color is actually present on the receiver screen at any one instant in each of the three sequential systems here described, persistence of vision causes the picture screen to appear as if all three primary colors were present simultaneously throughout the area of the screen. We may then conclude that a color television image is equivalent to three images superimposed one on top of the other, each image being made up of light of one of the primary colors. As we shall see later, in each of the proposed systems the color images may be somewhat less detailed than the equivalent black-and-white image. But this is a difference merely of degree. In principle, a three-color television system employs the equivalent of three images, each depicted in light of one of the primary colors.

An important implication of this principle is this: All other factors being equal, the video channel occupied by a three-color television system must be three times as wide as that required for an equivalent black-and-white system. A color system equivalent in pictorial detail to the black-and-white system must transmit three images, each containing 200,000 dots, and all these images must be transmitted in the same time as that of one image in the black-and-white system. Hence the rate of transmitting picture elements (dots) in color is three times the rate in black and white, and the video channel width must be trebled to accommodate the transmission.

If a color-television system is to be fitted into a 6-megacycle channel, something must be sacrificed. Either the dots must be reduced in number, thereby reducing the pictorial detail, or the number of scanning lines must be reduced, thereby again reducing the pictorial detail, or the rate of scanning the fields must be reduced, thereby incurring flicker unless the picture brightness is dimmed by a substantial amount, or the number of fields per color picture must be increased, thereby increasing the blurring of motion. Some such compromise has been adopted in all three of the proposed color systems. The nature of the compromise, and its effect on the over-all image quality, is an important basis on which the systems must be compared.

The fact that three separate, apparently superimposed, images are involved in a color-television system gives rise to several potential sources of trouble. The first is "improper registration". The three primary-color images must be precisely the same size, have precisely the same shape, and must appear to lie one directly over the other if the color reproduction is to be accurate. Lack of registration is familiar in color printing. It occurs when the impression of one printing plate is out of position with respect to the other impressions. The outlines of objects are thereby blurred, the fine detail of the image is obliterated, and objects are outlined with color fringes.

Considerable care is required in the design and operation of a color-television system to secure proper registration. The three types of systems described herein employ different methods to secure registration, and their performance in this respect differs, as outlined in chapter 6. In particular, the field-sequential camera has at present

better performance in this respect than the dot- and line-sequential cameras.

The second source of difficulty, rooted in the sequential nature of a color-television image, is known as "color breakup". When the eye moves while viewing a color-television image, either casually or in following the motion of the image, the successive fields laid down on the screen occupy slightly different positions on the retina of the eye. If each successive field is displayed in one primary color, as in the field-sequential system, the separate primary colors are then visible in the form of fringes around the outlines of objects. This effect is present only in the field-sequential system, since in the dot- and line-sequential systems the color-switching rate is many times greater. Fortunately, the majority of observers possess, or soon acquire, a substantial tolerance for the color-breakup effect, under normal conditions.

The third effect is "color fringing". This occurs when a rapidly moving object is televised in color. If the object has color components in more than one primary (as do the vast majority of objects), and if the object is scanned in successive fields of different color (as in the field-sequential system), the object will be scanned in one color on one field and in another color on the next successive field. If the object is moving rapidly, its position on the screen will have changed between the successive scannings, and the object will appear fringed with color or, if the motion is very rapid, as several objects in different colors. Like color breakup, color fringing does not occur to a noticeable degree in the dot-sequential and line-sequential systems, since the color-switching rate is many times greater.

11. Color fidelity: How true is the color reproduction?

It is evidently of paramount importance that the reproduced colors be sufficiently faithful copies of the original colors to induce a sense of realism in the observer. A first requirement of faithful color rendition is that the primary colors employed at the receiver are chosen to cover a suitably wide gamut of colors. Since a free choice of phosphors and color filters is open to all, this factor does not necessarily operate to the advantage of one system over the others.

A second requirement for proper color rendition is color balance, a term that indicates that the brightnesses of the three primary-color images are in proper proportion. This is especially important when all three primaries are combined to produce a white (or nearly white) element in the picture. Unless the three primary images are in precise balance, the element intended to be white will exhibit a greenish, reddish, or bluish tinge (or other off-color tinge), depending on what primary (or what pair of them) is present in disproportionate brightness. Color balance is particularly important in reproducing the delicate tones of flesh color. A slight excess of green, for example, can transform a ruddy glow into a sickly pallor. Color balance requires the correct choice of camera color filters to accord with the receiver color primaries and with the lights used in the studio. It also depends upon the correct operation of the transmitter, the correct functioning of the receiver, and the correct adjustment of contrast. Here again these basic techniques of maintaining color balance can be used by all three systems, although there are differences in the ease with which it can be accomplished.

So long as the dots, lines, and fields occur in their proper places and in the proper sequence, and so long as the proper color balance is maintained, a high standard of color reproduction is possible in each of the proposed systems of color television. The observed differences in color fidelity are ascribable partly to poor color balance and partly to lack of registration (of dots, lines, or fields with minor effects due to color breakup and color fringing as described in section 10.

12. The addition of black-and-white detail to a color image

In color printing it is customary to employ four impressions, one in each of the primary colors, and the fourth in black (or dark brown). The black plate impresses shades of gray over the colors. One purpose of the black impression is to overcome an inherent shortcoming of the primary-color printing inks which, by themselves, are not able to represent as dark shades of gray as may be desired. Another purpose is to provide one impression (the black impression) which carries the basic pictorial detail of the subject, and thus relax to some extent the need for precise register among the three primary-color impressions.

This printing technique suggests that a similar method might be used in color television. If all the fine pictorial detail of a color-television image is presented in shades of gray, the detail of the primary colors may be allowed to be somewhat coarser without adverse effect on the over-all sharpness of the color image. This would allow an image of given sharpness to be sent over a narrower channel than would be required if the primary colors were sent in full detail and no gray image was employed.

Suppose then that the color image is to have a pictorial detail corresponding to 200,000 dots, equal to the detail of the present standard black-and-white image, and is to be sent at a field rate of 60 per second with conventional line interlace. Suppose further that all fine details having a width not greater than corresponding to two dots are transmitted only in shades of gray, whereas all details of width greater than two dots are transmitted in three colors. Then the fine detail in the gray image corresponds to frequencies from 2 to 4 megacycles and thus requires a video channel width of 2 megacycles, while each of the three primary-color images correspond to frequencies from zero to 2 megacycles and thus require three more video channels of 2 megacycles. The total video channel width is therefore 8 megacycles. By the method of dot interlace the three 2-megacycle color channels may now be interpersed and compressed. In the RCA form of the dot-interlace system the color channels are compressed into a single video channel from zero to 4 megacycles, or two-thirds of the sum of the three channels. This color dot signal is finally mixed with the fine detail gray signal and we have the entire picture signal occupying a video channel width of 4 megacycles, permitting it to be transmitted on a 6-megacycle radio channel. (A more detailed description of dot interlacing the color images and mixing them with the fine detail gray image is given in chapter 5.)

Hence, by confining the finest detail to shades of gray, and by using dot interlace, it is possible to compress a color transmission into the same channel now occupied by the black-and-white transmission, and to retain substantially the full detail of the image (200,000 dots) and the full flicker-brightness performance (60 fields per second).

The technique of transmitting fine detail in shades of gray only is known as the "mixed highs" system, from the fact that the highest

frequencies in the three color signals are mixed together before transmission to the receiver.

In the example given above, the dividing line between full-color transmission and gray-tone transmission was taken at a detail size equal to the width of two dots. The dividing line can be set at details considerably larger than this. In fact, in the RCA system, as described in chapter 5, certain practical shortcomings of the dot-interlace transmission process, currently embodied in the apparatus, reduce the detail transmitted in true color to items having the width of eight dots. Since there are some 420 dots or more to the line this still represents a very good color detail and no adverse effects are noted. Moreover, the shortcomings of the present apparatus in this respect are not fundamental and can be compensated rather exactly should the need arise.

The technique of transmitting fine detail in tones of gray is applicable only to the dot-sequential system of color television. It is not applicable to the line-sequential and field-sequential systems because these systems make no color distinction between the dots along any one line of the image. Hence, whatever detail is provided, as each line is scanned, must necessarily be provided in full to the particular color present in that line. Thus all three color images contain the fine detail, and there is no opportunity to confine the fine detail to a single (gray) image.

13. Relation of color service to existing black-and-white service

The principles discussed in earlier sections of this report refer to the intrinsic properties of sequential color systems which are rooted in the choice of scanning method. These properties determine the long-time utility of each system, since they are based on the fundamental attributes of human vision.

There are several additional properties of a less fundamental nature, but of great economic importance, which refer to the transition from the existing black-and-white service to the future color service. The problems of this transitional period will endure so long as both black-and-white and color transmissions are available in a given locality, and this situation may continue in many populous areas for an indefinite period. Accordingly the committee believes that the relative suitability of the color systems for public use must be judged, in part, in terms of their relation to the existing black-and-white service.

The transitional properties of the color systems are described by three terms—compatibility, adaptability, and convertibility—defined as follows:

Compatible color system.—A compatible color system is one capable of producing black-and-white images on existing black-and-white receivers without any modification of the receivers.[1]

Adaptable color system.—An adaptable color system is one in which existing black-and-white receivers can be modified to receive color transmissions in black-and-white.

[1] This definition was first advanced by the Joint Technical Advisory Committee in testifying before the FCC at the color hearing and adopted by the majority of those testifying thereafter. It is restricted to the rendition of color transmission on black-and-white sets as defined. Another form of compatibility, sometimes called reverse compatibility, relates to the reception of black-and white transmissions on color receivers. Since the latter type of compatibility can be possessed by color receivers of all three systems to a nearly equal degree, and will undoubtedly be possessed by all color receivers manufactured during the transitional phase, the committee believes that reverse compatibility is not an important distinction between systems.

Convertible color system.—A convertible color system is one in which existing black-and-white receivers can be modified to receive color transmission in color.

In comparing systems on the basis of adaptability or convertibility, the cost, inconvenience, and technical complexity associated with the modifications are evidently important considerations. Comparative quantitative data on these aspects are at present inconclusive, in view of the rapid state of development of the systems, but it is possible to give a qualitative estimate of the relative adaptability or convertibility of each system.

The transitional properties of each system are stated in chapters 3, 4 and 5, and compared in chapter 6.

14. System characteristics

Those performance characteristics which are of paramount importance in comparing color television systems are—

(*a*) *Resolution.*—The amount of pictorial detail or the number of picture elements (dots) contained within the picture area. The greater the number of dots, the more copious the pictorial detail in the reproduced image.

(*b*) *The flicker-brightness relationship.*—The rate at which the successive fields are scanned determines the maximum brightness of the reproduced picture, above which flicker becomes objectionably apparent.

(*c*) *Continuity of motion.*—The number of fields presented per second must be high enough to permit motion in the image to be rendered in apparently continuous fashion.

(*d*) *Effectiveness of channel utilization.*—Since the space in the radio spectrum for television channels is severely limited by the needs of other services, it is of paramount importance to determine the relative effectiveness of the color systems in utilizing the 6-megacycle channel. The preceding sections have shown that the channel width is devoted to the performance characteristics above named; that is, adequate resolution, adequate brightness without flicker, and adequate continuity of motion. A system whose performance is inadequate in any of these aspects makes relatively ineffective use of the channel. In comparing two systems having equally adequate performance in one or two of these aspects, the system having superior performance in the remaining aspect or aspects is defined as making the most effective use of the channel. On this basis it is possible to compare the systems, on a qualitative basis, with respect to channel utilization.

The techniques for improving channel utilization include line interlace, dot interlace, the mixed-high method, and the use of long-persistence receiver screen materials to reduce flicker.

(*e*) *Color fidelity.*—Color fidelity is the degree to which the television receiver reproduces the colors of the original scene. It is particularly important that the system be capable of maintaining color fidelity over extended periods of time.

(*f*) *Defects associated with superposition of primary-color images.*—These defects include improper registration, color breakup, and color fringing.

(*g*) *Cost of color receivers.*—A final basis of comparison is the cost of a color receiver having adequate performance in each of the respects

listed above. While it is manifestly necessary to take this factor into account in arriving at a decision between the systems, the presently available cost figures are, in the opinion of the committee, not indicative of the situation to be expected when manufacture of receivers actually commences on a large scale. If, as seems probable, a tricolor tube is to be used in future receivers, no matter which system is adopted, the costs will be more nearly equal than if a rotating filter disk is used in one system (CBS), a three-tube dichroic-mirror receiver in another (RCA) and a triple-projection receiver in the third (CTI). In view of the fact that a definitive answer to the question of receiver costs cannot be available until the color service is actually instituted and large-scale production is under way, the committee believes that it will not be possible to take the relative receiver cost factors into consideration in arriving at the necessary policy decisions affecting color television.

In the following chapters these factors are related explicitly to the three proposed systems, and the apparatus used in each system is described as it relates to performance, complexity, and cost.

CHAPTER 3

THE CTI LINE-SEQUENTIAL SYSTEM

15. Introduction

The information on the CTI system, contained in this chapter, is based in part on the document "Written Comments of Color Television, Incorporated" dated August 25, 1949, submitted in evidence before the FCC hearing, and in part on verbal comments offered by representatives of CTI at the demonstrations of the system. The description is based on the system as demonstrated by CTI on May 17, 1950; namely, that using the so-called "interlaced color shift."

16. The CTI scanning pattern: How the picture is put together

Figure 1 illustrates the manner in which the CTI line-sequential color television image is scanned. The figure shows the scanning lines in the six fields required to make up a complete color picture. The lines are separated by blank spaces of equal depth. In the first field the topmost line (line 1) is scanned wholly in green, the next line below (line 3) wholly in blue, and the next line (line 5) wholly in red. As successive lines are scanned (lines 7, 9, 11, etc.) the sequence of lines in green, blue, and red is repeated until the bottom of the image is reached. This completes the scanning of the first field.

Thereafter the second field is scanned in the same manner, also covering lines numbered 1, 3, 5, 7, 9, etc. Line 1, this time is scanned in red, line 3 in green, line 5 in blue, and so on until the bottom of the second field is reached.

The third field is scanned next, again covering only the odd lines. This time line 1 is scanned in blue, line 3 in red, and line 5 in green, and so on until the last odd line of the field is reached.

The image has now been scanned in all three colors covering the odd lines only, and this process is then repeated for the even lines, which lie midway between the odd lines scanned in the first three fields.

In the fourth field the color sequence is as follows: line 2 is scanned in green, line 4 in blue, line 6 in red, and so on, down to the bottom of the field. For the fifth field the color sequence is line 2 blue, line 4

red, line 6 green, and so on, and finally in the sixth field the color sequence is line 2 red, line 4 green, line 6 blue, and so on.

All the lines have now been scanned in all three colors and a complete color picture has been produced.

The image consists of 525 lines, about 490 of which are visible on the viewing screen, and the fields are scanned at a rate of 60 per second. The radio channel width used is 6 megacycles, corresponding to a video band width of about 4 megacycles. These numbers are identical to those employed in the standard black-and-white system. Consequently the number of picture elements per line is the same as in the black-and-white system, about 420 picture elements per line. The maximum number of picture elements in the image, comprising 490 visible lines each with 420 dots, is about 200,000.

The whole sequence of color scanning is completed after six fields have been scanned, and the sequence then repeats. Since the field scanning rate is 60 per second, there are one-sixth as many, or 10, complete color pictures per second.

17. Essential equipment of the CTI system

Before discussing the performance of the CTI system, it is necessary to describe briefly certain essential items of equipment, unique to this system. These include the camera at the transmitter and the viewing apparatus at the receiver (picture tubes and viewing screen).

The CTI camera employs one image orthicon camera tube, of the type commonly used in black-and-white broadcasts. When used for black-and-white transmissions, one lens focuses the image on the sensitive plate of the camera tube. When used for color transmission a system of color-selective filters is used for producing three images side by side on the sensitive plate, one for each of the three primary colors.

The lenses are so positioned that they form three images on the sensitive plate, one beside the other in a horizontal row. These images appear in the three filter colors, and are arranged in the order red, green, blue, from left to right.

The three images are scanned, from left to right as a group, by sweeping a beam of electrons across the sensitive plate. As the beam sweeps it creates an electrical signal proportional to the values of light and shade along a particular line in each of the images. Consequently as the beam sweeps once across the group of images, it scans first a line in red, then a line in green, and finally a line in blue.

The beam then scans across the group of three images, along an appropriate path parallel to the first, and thereby produces three more lines in red, green, blue, and so on. This scanning process continues, each passage of the beam across the group creating three lines in the three primary colors, until the bottom of the group of images is reached. The beam has now scanned a complete field, corresponding to one of the scanning patterns shown in figure 1 and described in section 16.

The beam then returns to the top and the scanning process is repeated across the group of images. By properly adjusting the starting point of the scanning process in each successive field the color sequence is arranged to conform with the scanning sequence described in section 16 and illustrated in figure 1.

The signal created by the camera is transmitted to the receiver. Here the images are reproduced on the screen of a picture tube. The screen is composed of three different types of fluorescent material, arranged side by side, one material producing red light, another green light, and the third, blue light. The scanning beam in the picture tube moves over this three-part screen in exactly the same pattern as the beam in the camera and thereby recreates on the screen three images side by side, in red, green, and blue. These images are, therefore, replicas of the optical images focused on the sensitive plate of the camera tube.

The three primary-color images are combined by projecting them through three lenses onto a common viewing screen. Care must be taken, in the scanning of the camera and picture tube and in the positioning of the camera and projection lenses, to insure that these three images are precisely in register on the viewing screen. A reproduction of the original scene in color thereby appears on the projection screen.

If a black-and-white receiver, of the type commercially available in the United States, is tuned to a color transmission from a CTI color camera, a black-and-white image results. This follows from the fact that the CTI system operates with 525 lines, 60 fields per second, which are identical to the scanning rates of the standard black-and-white system. For this reason, the CTI system is known as a compatible system, i. e., a color-television system which will provide a black-and-white version of the color transmission on present-day black-and-white receivers, without requiring any change in the receiver.

18. Performance characteristics of the CTI system

On the basis of the foregoing description of the CTI system, we can examine its performance characteristics in accordance with the outline presented in chapter 2, section 14.

The first of these characteristics is resolution, section 14 (*a*). Since the scanning rates and channel width of the CTI system are identical to those of the standard black-and-white system, the number of picture elements per line is, in theory, the same in the two systems, namely about 420, and the number of lines visible in the image is also the same, about 490. Therefore the over-all resolution of the CTI and black-and-white systems are the same, about 200,000 picture elements.

These resolution figures are based wholly on the geometry of the scanning pattern, and take no account of other effects, such as improper registration and line crawl, which may reduce the effective resolution available in the CTI system, as discussed below.

The second performance characteristic is the flicker-brightness relationship, section 14 (*b*). Since the number of fields per second in the CTI system is 60, the same number as in the black-and-white system, the large-area flicker performance is approximately the same. The small-area flicker effects are accentuated by the fact that each line is scanned in any one primary color only 10 times per second. Moreover, two lines of the same color in any one field are separated by two other lines in different colors plus three blank spaces. These two effects together cause an apparent motion of the lines upward or downward in the picture, known as line crawl. In common with all flicker effects, line crawl becomes more pronounced as the image becomes brighter. Consequently this effect may in fact set the upper limit on the acceptable brightness of a line-sequential color image.

The phenomenon of line crawl is accompanied by an apparent grouping of the lines and this effect reduces the apparent vertical resolution below the value set by the scanning pattern geometry.

Interline flicker is also pronounced in the image produced in this system, particularly when a primary color is being transmitted, because each line is then illuminated only 10 times per second. If the image is bright, sharply defined horizontal edges exhibit a marked blinking effect.

The third performance characteristic, section 14 (*c*), is continuity of motion. So far as large-area portions of the image are concerned the continuity is determined by the field rate, so the performance is not noticeably different from that of the black-and-white system. On the other hand, the sharpness of edges of colored objects in motion is noticeably affected by the fact that the complete color sequence occurs at a rate of 10 per second, whereas the complete sequence in black-and-white images occurs at 30 per second.

The fourth characteristic, section 14 (*d*), is effectiveness of channel utilization. Here the principal shortcomings of the CTI system, as thus far demonstrated, are the impracticability of using dot interlace and the poor small-area flicker performance. If dot interlace were attempted, while the resolution would be doubled, the complete color-sequence rate would be lowered to 5 per second, thus greatly accentuating the small-area flicker effects.

The nature of the compromise necessary to fit the CTI system into the 6-megacycle channel can now be stated. The resolution and the large-area flicker performance are maintained, so far as scanning is concerned, at the values of the black-and-white system, but to secure this performance in color it is necessary to lower the rate of the complete scanning cycle to 10 per second, one-third the value of the black-and-white system. Accompanying the lower scanning cycle rate are small-area flicker effects, notably interline flicker and line crawl.

The fifth performance characteristic is color fidelity, section 14 (*e*). On the assumption that proper fluorescent materials and color filter are used in the picture tube and proper color filters are used in the camera, the large-area color fidelity of the system suffers no limitation. Lack of registration, noted below, may affect adversely the color fidelity in small areas, particularly in the fine details and along the edges of brightly colored objects.

Superposition defects, section 14 (*f*), are limited to improper registration, since color breakup and color fringing are confined to the depth of one or two scanning lines. Faulty registration may appear in four independent ways: (1) Misadjustment of the camera optics may produce color images of different size, shape, or orientation on the sensitive plate of the camera tube; (2) the motion of the camera electron beam may not be uniform or not properly alined with the images; (3) the scanning at the receiver picture tube may not produce congruent and properly oriented images; and (4) the projection lenses of the receiver may not bring the images into correct superposition on the viewing screen.

Finally, the method of depicting fine detail, section 14 (*d*), in this system is to impose the fine detail on all three primary-color images. The mixed-highs system of transmitting fine detail only in shades of

gray cannot be used in the line-sequential system for the reasons outlined in section 12.

19. Summary

The essential attributes of the CTI line-sequential system are as follows:

(*a*) It is a compatible system, employing the same number of lines per picture and the same number of fields per second as the black-and-white system. This permits a black-and-white version of the color image to be reproduced on standard black-and-white receivers, without modification of the receiver.

(*b*) It achieves resolution and large-area flicker performance equivalent to the black-and-white system, but is deficient in apparent vertical resolution and small-area flicker performance.

(*c*) It is subject to registration difficulties.

(*d*) It does not employ the channel width effectively, since neither the dot-interlace nor the mixed-highs principle are employed.

Chapter 4

The CBS Field-Sequential System

20. Introduction

The information in this chapter is based on the testimony submitted by the Columbia Broadcasting System to the FCC during the color-television hearing, and on demonstrations of the CBS system viewed by members of the committee prior to May 1, 1950.

21. The CBS scanning pattern

Figures 2 and 3 illustrate the manner in which the CBS field-sequential color-television image is scanned. In figure 2 is shown the conventional line-interlaced version of the system. Each picture consists of 405 lines, divided into two fields of 202½ lines each. The fields are scanned at a rate of 144 fields per second. As shown in the figure, all the lines in one field are scanned in blue, the next in green, and so on in the sequence red, blue, green.

After six successive fields have been scanned, every dot in the image has been scanned in all three primary colors. Consequently, the whole scanning sequence occurs at a rate one-sixth as great as the field-scanning rate, that is, 144/6=24 complete scanning cycles per second. The complete scanning cycle is termed a "color picture." The color-picture rate of the CBS system is, accordingly, 24 per second.

In the dot-interlaced version of the CBS system (fig. 3) each line is broken up into dots, all of the same primary color, with blank spaces of equal size between the dots. These blank spaces are filled in with dots of another primary color, on the next successive scanning of that line. Consequently, a given dot in the image is scanned in all three colors only after 12 consecutive fields have been scanned, and the complete scanning cycle occurs at a rate of 144/12=12 color pictures per second. The corresponding color picture rate of the CTI line-sequential system (sec. 16) is 10 per second, and that of the RCA dot-sequential system (sec. 26) is 15 per second.

22. Essential apparatus of the CBS system.

The CBS color camera employs one image orthicon camera tube and one lens. Between the lens and the sensitive plate of the camera tube is located a filter disk containing six transparent filter segments, two for each of the three primary colors. The disk rotates at 1,440 revolutions per minute, so the filter segments move past the sensitive plate at a rate of 144 segments per second. The disk rotation is synchronized with the 144-per-second field-scanning rate of the camera. In this manner all the lines in one field are illuminated in red light, the lines of the next field in blue, and the lines of the third field in green, and so on, in the sequence red, blue, green.

These elements of the CBS camera are the same in the line-interlaced and dot-interlaced versions of the system. In the dot-interlaced version, the electrical output of the camera is rapidly switched on and off. The camera is thus effectively connected to the circuit during the scanning of a particular dot, and is disconnected during the scanning of the adjacent blank space, then reconnected for the next dot, and so on. The rate of connecting and disconnecting the camera is about 9,000,000 per second (9 megacycles).

Two types of receiver have been demonstrated by CBS. In the first a rotating filter disk, similar to that used in the camera, is positioned before the screen of the picture tube. This disk carries six filter segments, two in each of the three primary colors. The disk rotates at 1,440 r. p. m. and is synchronized with the 144-per-second field-scanning rate of the receiver. The image formed on the screen of the picture tube is displayed in white light, and this light, passing through the colored filters, takes on successively the three primary colors. Thus, the light emerging from the receiver is red on one field, blue on the next successive field, and green on the third, and so on. By means of synchronizing impulses, the position of the receiver filter disk is controlled so that red light is produced by the receiver only when the red filter is positioned before the camera tube at the transmitter, and similarly for the other two colors.

The system thus comprises two filter disks rotating in rigid synchronism, so positioned that the filters before the camera and the picture screen always have the same color at any instant.

It is not considered feasible to use a rotating disk with picture tubes exceeding about 12½ inches in diameter because of the physical size of the disk involved.

The second type of receiver is very similar to that used in the CTI system, described in section 17, chapter 3. A single picture tube is used, but three separate images are formed on the screen, one above the other, one in each of the primary colors. The blue-colored image is formed only during the fields scanned in blue by the camera, and similarly for the images in the other two colors. An optical system comprising three lenses projects the three images so that they fall one on top of the other, on a common viewing screen. The scanning of the images, and the choice of lenses and positioning of the lenses with respect to the image, must be precisely controlled to preserve registration between the projected images. By using a green phosphor of comparatively long decay time this type of receiver eliminates practically all flicker and color break-up.

Both types of receiver may be used with the line-interlaced as well as the dot-interlaced version of the system. For dot-interlaced reception, additional circuits are required which effectively connect and disconnect the picture tube in synchronism with the corresponding connections and disconnections of the camera tube, described above.

23. Performance characteristics of the CBS system.

We proceed now to examine the performance characteristics of the CBS system, in accordance with the outline of sections 13 and 14, chapter 2.

Resolution (sec. 14 (a)).—For reasons given below (under flicker-brightness relationship), the field-scanning rate of the CBS system must be chosen substantially higher than that of the black-and-white system. The rate used in the CBS demonstrations is 144 fields per second.

In section 7 it was explained that the standard black-and-white television system has a geometric resolution of approximately 200,000 picture elements per frame (two interlaced fields). This corresponds to a field repetition rate of 60 per second and a video band width of 4 megacycles (6-megacyle radio channel).

In the CBS line-interlaced system the geometric resolution is also determined by the number of picture elements in two interlaced fields, but the field repetition rate is now increased to 144 per second. It was explained in section 9 that for a given band width the number of picture elements in a frame is inversely proportional to the field-scanning rate. The geometric resolution of the CBS line-interlaced system is therefore 200,000 times 60/144 or 83,000 picture elements. Thus the higher field-repetition rate decreases the geometric resolution of the CBS line-interlaced system to 60/144 or 42 percent of that of the standard black-and-white system.

In the dot-interlaced version of the CBS system, the resolution is doubled in theory, and very nearly doubled in practice. Thus the resolution of the dot-interlaced CBS color image is about $2 \times 83{,}000 = 166{,}000$ picture elements or 83 percent of the resolution of the standard black-and-white image.

Flicker-brightness relationship (sec. 14 (b)).—In a field-sequential color system, such as the CBS system, flicker is a much more difficult problem than in a line-sequential or dot-sequential color system. This follows from the fact that the eye is more sensitive to large-area flicker than to small-area flicker and from the fact that in the field-sequential system, the interruption of the image in changing from color to color occurs over the whole picture area.

To counteract the prominence of large-area flicker, it is necessary to increase the field-scanning rate by a substantial amount. Experience has indicated that, for equal flicker-brightness performance under all conditions, the field-scanning rate of a field-sequential system should be about 3 times that of a black-and-white system. Actually, in the CBS system, the field rate has been increased by the ratio $144/60 = 2.4$ times, rather than 3 times. The lower value was chosen to preserve as much geometric resolution as possible within the confines of the 6-megacycle radio channel.

It follows that large-area flicker is more prominent in the CBS system than in the black-and-white system. The comparable flicker rates in the two systems are 48 per second in the CBS color system,

(twice the complete picture rate) and 60 per second in the black-and-white system (the field-scanning rate). The difference in the rates is 12 per second. According to the Ferry-Porter flicker law, this difference in flicker rate would allow the black-and-white image to be about 3 times as bright as the color image, for equal visibility of flicker.

Corresponding to these theoretical values are various practical values quoted in the testimony given at the FCC hearing. It was reported that flicker can be held within tolerable levels if the high-light brightness of the CBS color image is not greater than about 25 foot-lamberts, whereas the corresponding limit for the standard black-and-white image is well above 100 foot-lamberts. The 25-foot-lambert figure was quoted for the filter-disk type CBS receiver. In the projection-type CBS receiver, using a long-persistence phosphor in the green image, higher brightnesses were attained within the tolerable limit of flicker.

At the request of the committee, tests of large-area flicker were made by the National Bureau of Standards. The results are given in annex D of this report.

So far as small-area flicker is concerned, the CBS line-interlaced system is not substantially different from that of the black-and-white system, and it may be somewhat superior when the colors transmitted are not too close to saturated red, green, or blue. The dot-interlace version of the CBS system is, on the other hand, somewhat inferior in this respect to the black-and-white system. Small areas (dimensions of the order of a picture element) are scanned at a color-picture rate of 12 per second in the dot-interlaced CBS system.

Interline flicker should be somewhat more pronounced in the CBS system, when colors in the scene approximate the primary colors, because adjacent lines are then laid down at intervals of one-forty-eighth second, compared to one-sixtieth second in the black-and-white system. However, when the colors comprise components of all three primaries in roughly equal amounts (and this is likely to be the case in bright—e. g., white—portions of the scene), adjacent lines are laid down at intervals of one one-forty-fourth second, and the interline flicker is then less noticeable than in the other systems.

Continuity of motion (sec. 14 (c)).—Continuity of motion, like flicker, is affected in the CBS system by the composition of the colors transmitted. If the object in motion is displayed in one of the primary colors, the other two primaries being substantially absent, then that portion of the image is illuminated only one-third of the time, and the motion may appear jerky. If two or three primary-color components are present, the illumination is more nearly continuous and the discontinuity is not so pronounced.

In either event, motion is portrayed with sufficient smoothness to satisfy the eye, at color-picture rates in excess of 10 per second. So far as large areas are concerned, this requirement is met by both the line-interlaced and the dot-interlaced versions of the CBS system. In small areas, notably the detail of vertical and horizontal edges of objects, the dot-interlaced version of the system may display ragged edges on an object in rapid motion.

Noncompatible and convertible nature of the CBS system (sec. 13).—The fact that the field-scanning rate of the CBS system must be substantially higher than that of the black-and-white system leads

to a most important difference in receivers designed for the two systems. In the black-and-white system, the vertical (field) scanning occurs at a rate of 60 per second, and the horizontal scanning at a rate of 15,750 per second (30 frames per second, each having 525 lines). In the CBS field-sequential system, the vertical (field) scanning occurs at 144 per second, and the horizontal scanning at 29,160 per second (72 frames per second, each of 405 lines).

The respective values in the two systems are so different that receivers built for black-and-white reception cannot be adjusted to scan at the higher rates required for the CBS color system, unless modifications are made in the receiver scanning circuits. This fact is the root of the "compatibility" argument. The cost of modifying existing receivers to make them operative on both sets of scanning standards may be substantial, and no reliable data have been submitted as to what this cost would be. However, by modifications of the circuits and the addition of a rotating disk, existing sets with picture tubes less than 12½ inches diameter can be converted to color reception. Thus the CBS system is convertible but not compatible.

Effectiveness of channel utilization (sec. 14 (d)).—We have previously noted that both the line-interlaced and the dot-interlaced CBS systems have a flicker-brightness performance somewhat lower than that of the black-and-white system. The line-interlaced version displays resolution which is substantially lower than the black-and-white value. The dot-interlace version has poorer performance so far as small-area flicker and small-area continuity are concerned, but achieves resolution not markedly below that of the black-and-white system. The dot-interlace system makes substantially more effective use of the channel and is to be preferred, on this account, to the line-interlaced version of the system.

The nature of the compromise, adopted to fit the CBS system into the 6-megacycle channel, is determined principally by the large-area flicker effect. Since the color sequence is introduced by changing the color of the whole image at once, it is necessary to increase the field rate by a substantial amount, relative to the black-and-white system, and to lower the geometric resolution in proportion.

It may be argued, therefore, that the field-sequential scheme is less effective in channel utilization, because it devotes a disproportionately large amount of spectrum space to the reduction of flicker, at the expense of a substantial loss in resolution. Stated in another way, the use of the field-sequential technique, with dot-interlace, results in a picture having less geometric resolution (about 83 percent of the black-and-white value) and lower large-area flicker-brightness performance (brightness at flicker threshold about one-ninth the black-and-white value, for a given phosphor decay characteristic). Finally, the fact that the mixed-highs technique cannot be used in the field-sequential system has the effect of lowering the channel utilization, relative to that of a dot-sequential color system using mixed highs.

Color fidelity (sec. 14 (e)).—There is, as noted previously, no basic difference in the color fidelity of the three color systems. This statement assumes a proper choice of filters, phosphors, and light sources, proper color balance and gradation, and freedom from superposition defects. In practice, as the systems were demonstrated to the committee, the CBS system displayed superior color fidelity to the other two systems when filter-disk receivers were employed. This

superiority is explained by better color balance (the same area is scanned in all three primary colors in the CBS camera, and in the filter-disk type CBS receiver as noted below), and by more accurate registration between the primary color images.

At the request of the committee, tests on the fidelity of color reproduction by both the CBS and the RCA systems were undertaken by the National Bureau of Standards. Results are given in annex E of this report.

Superposition defects (sec. 14-f).—A noteworthy characteristic of the field-sequential system is the fact that the color sequence occurs at a slow rate (144 per second), compared with the CTI line-sequential system (15,750 per second) and the RCA dot-sequential system (10,800,000 per second). The slow color sequence, while making the flicker problem comparatively serious, has the compensating advantage of allowing the color sequence to be introduced mechanically by the rotating filter-disk method. Since, in this method, filter segments are placed successively in front of the camera tube and picture tube, it is necessary to employ only one scanned surface for all three primary colors. The CTI and RCA systems require in the camera a separate image for each of the three primary colors, and similar images in the receiver.

Since only one scanned surface is used in the CBS filter-disk system, maintenance of proper registration between the primary color images is a simple matter. The optical elements are common to all three images, so optical misregistration cannot occur. Electrical registration is assured if the scanning pattern of each field is precisely congruent to those preceding and following it, and this requirement is readily met, provided only that the scanning system is adequately protected from stray magnetic and electric fields. The absence of registration defects is a noteworthy characteristic of the CBS system, compared with the present state of development of equipment in the two other color systems.

The other types of superposition defects are, however, more pronounced in the CBS system than in the others, due to the inherent nature of the scanning process. Color break-up and color fringing are detectable when either the eye or the image are in rapid motion.

Depiction of fine detail.—The CBS system cannot, by virtue of the nature of the scanning method used, take advantage of the mixed-highs principle. In compensation for this fact, and to improve the resolution, a circuit technique known as "crispening" has been developed by CBS. This is a method of causing the vertical edges of objects to appear more sharply defined. This technique is not unique to the CBS system, but may be used in any system to achieve the same result. It is believed, therefore, that the use of the crispening technique is not a significant difference between systems.

24. Summary

The essential characteristics of the CBS field-sequential system are as follows:

(*a*) The CBS system scanning standards are not compatible with the black-and-white scanning standards. This requires modification of existing black-and-white receivers, and additional complication in receivers of the future, to permit reception on both sets of scanning standards.

(*b*) The line-interlaced version of the CBS system has substantially poorer resolution than the black-and-white system. The dot-interlaced version has slightly poorer resolution than the black-and-white system. The crispening technique, applied to the CBS system, improves its resolution. However, this technique, applied to other systems, would improve their apparent resolution also.

(*c*) The large-area flicker-brightness performance of the CBS system is inferior to that of the black-and-white system. This means that CBS color image cannot be as bright, by a factor of 5 to 10 times, as the black-and-white image, for equal freedom from flicker. The dot-interlaced version of the CBS system, operating at the low color-picture rate of 12 per second, has a small-area flicker performance (inter-dot flicker) not as good as the black-and-white system.

(*d*) The color fidelity of the CBS system, as demonstrated, is superior to that of the other color systems. This superiority is due to the maintenance of better color balance and more accurate registration, both of which are implicit in the use of but one scanned surface in the camera and one in the receiver. Much of this advantage is lost in the electronic version of the CBS receiver, since three surfaces are necessary at the receiver.

(*e*) The effectiveness of channel utilization is satisfactory in the line-interlaced version, and is good in the dot-interlaced version. The impossibility of employing the mixed-highs technique lowers the channel utilization with respect to the dot-sequential color system.

(*f*) Existing receivers with picture tubes of 12½ inches and smaller diameter can be converted to color reception, but at an appreciable cost.

Chapter 5

THE RCA DOT-SEQUENTIAL SYSTEM

25. Introduction

The information in this chapter is based on the testimony submitted by the Radio Corp. of America to the FCC during the color-television hearing, and on demonstrations of the RCA system witnessed by members of the committee prior to May 1, 1950.

26. The RCA scanning pattern

Figure 4 shows the manner in which the RCA dot-sequential color television image is scanned. The basic scanning pattern is identical to that of the standard black-and-white system, i. e., the image consists of 525 lines, scanned at a rate of 60 fields per second. About 490 lines of the image are active, and about one-eightieth of a second is available for the active scanning of all the picture elements in a single field.

Each line of any one field in the image consists of dots in the three primary colors. The dots are arranged from left to right in the sequence red, blue, green. The space between two dots of the same color—e. g., green—is equal to the width of the dots; consequently the dots tend to overlap each other.

On successive scannings of the same line, the dots are shifted, so that the position of a dot of given color falls midway between the positions of two dots of the other two colors, scanned on the preceding frame. Consequently at the end of two frames (four fields), every point on each line has been scanned in all three primary colors. The color picture rate is accordingly $60/4=15$ color pictures per second.

The positions of the dots on adjacent lines, scanned on successive fields, is shifted so that a dot of one color falls midway between the dots of the other two colors on the adjacent line. Consequently the whole area of the image, after four fields have been scanned, is covered with a uniform distribution of dots in the three primary colors.

The scanning of the RCA dot-sequential image is of the dot-interlaced variety, as may be appreciated by considering dots of one color only, e. g., green. As noted above, two green dots on one line are separated by a blank space, in which dots of red and blue are fitted, with some overlap. On the next scanning of that line, the space midway between two green dots is filled in by a green dot. The same sequence applies, on successive scanning of any given line, in respect to the red and blue colors. As a consequence of this dot-interlaced technique, the resolution of the RCA image is approximately twice as great as it would be if the interlacing was confined to the lines alone. The dots of any one color are laid down along each line at a rate of 3.58 million per second.

27. Essential apparatus of the RCA system

The camera, used in the demonstrations of the RCA system, employs three image orthicon camera tubes, one lens and a set of color selective mirrors which separate the light from the scene into three colors. Red light enters one camera tube, blue light the second tube, and green light the third tube. The sensitive plate of each camera tube is scanned in identical fashion, at the normal scanning rates of the standard black-and-white system, i. e., 525 lines per picture, 60 fields per second. In this fashion three complete images are televised, one for each of the primary colors. The optical and electrical adjustment of the camera must be such that each of these images is precisely congruent to, and properly oriented with, the others.

When the camera views a scene having fine detail, the output signal of each camera tube contains signal components up to 4 megacycles (actually components of higher frequency may be present but are not transmitted through the system). To take advantage of the mixed-highs principle, the signal from each camera tube is divided into two groups of frequencies. The components of frequencies above 2 megacycles, representing the finest detail in the image, are combined at the outputs of the three camera tubes. This mixed signal represents the finest details of the picture in tones of gray.

The signal components lower than 2 megacycles, corresponding to the respective primary colors, and representing all details of larger size, are transmitted separately. The structure of the image is depicted in color except for the smallest details, which are shown in tones of gray.

The three color signals are transmitted in interspersed fashion by means of a switch which connects and disconnects each camera tube in sequence to the transmitter. This switch (which operates electronically since no mechanical switch could operate at the high speed required), makes and breaks the connection to each camera in rotation at a rate of 3.58 million times a second. Each time a camera tube is connected, it generates a dot of the respective color. When disconnected, that camera is inactive, leaving a blank space in that color. As the switching progresses, the blank spaces between dots of one color are filled in by dots of the other two colors.

The net result is a sequence of overlapping dots along each line, in the sequence red, blue, green, each dot being somewhat larger than a picture element. Superimposed on the colored dot signal is the mixed-high signal, including details from the size of one picture element to several picture elements, in tones of gray.

Two types of receiver have been demonstrated by RCA. In the first type, three picture tubes are employed, one for each of the primary colors. By means of a high-speed electronic switch, like that at the transmitter, each tube is connected and disconnected from the receiver. This switch operates in strict synchronism with the transmitter switch. So the green tube, for example, is connected to the receiver only while green dots are being generated and is disconnected while the red and blue dots are generated. Consequently, on the face of the green tube, a dot-interlaced image appears which represents the image picked up by the camera tube which scans the scene in green. This image does not contain the finest detail of the picture, but the mixed-highs signal is also applied to each picture tube, through the switch, so that the fine detail is in fact present on the face of the green tube. The same arrangement is provided for the red and blue tubes, so that they reproduce images representative of those picked up by the red and blue camera tubes respectively, together with the mixed-highs component, derived from all the camera tubes.

The three primary-color images are combined by viewing them through a system of color-selective mirrors, which reflect light of a given primary color while transmitting light of the other two colors. Care must be taken to assure that the images on the three picture tubes are precisely the same size, have the proper orientation with respect to one another, and are congruent throughout. If these requirements are met, the primary-color images combine in register before the eye of the observer. The fine detail of the combined image, being present in equal amount in all three primary-color images, appears in tones of gray.

The second type of receiver employs but one picture tube, which is viewed directly. The viewing screen of this tube is composed of a very large number of small precisely alined areas, each area consisting of a cluster of three types of phosphor, which glow in the three primary colors. Each cluster represents a picture element which may be made to glow in any one of the primary colors. In one type of the tube demonstrated, three electron guns are used, one gun for each primary color. The guns are so positioned that the electron beams strike the screen at slightly different angles, having passed through perforations in a metal plate parallel to, and just behind, the screen. The angle of each beam is such as to cause it to fall on the phosphor of each cluster which glows in the color assigned to that beam. Thus each picture element in the image may be made to assume any primary color, by activating one gun as it passes that particular cluster, the other two beams remaining inactive during that interval.

To re-create the color image in the single-tube receiver, a high-speed switch, like those previously described, applies the picture signal to the three electron guns in sequence. The timing of the switch is such that the gun associated with one color becomes active at the instant corresponding to the time the camera tube of the same color is connected at the transmitter, and similarly for the other two colors. In this manner the clusters along each line in the image are caused to

assume the color and intensity associated with the sequence of red, blue, and green dots transmitted over the system.

The single-tube receiver employs but one scanned surface, so the optical and electrical requirements for proper registration are considerably simpler than in the three-tube type of receiver. Moreover, the electrical and optical components of the single-tube receiver are substantially simpler.

28. Performance characteristics of the RCA system

The performance characteristics of the RCA system, based on the outline of sections 13 and 14, chapter 2, are as follows:

Resolution (sec. 14 (a)).—The resolution of the system must be considered in two categories: the mixed-highs component and the color components. In the mixed-highs component, the maximum picture-signal frequency is 4 megacycles, the same as that of the black-and-white system. Since the time for scanning the active portion of each field is also the same, one eightieth of a second, the number of picture elements per field is the same, about 100,000, and the total resolution (contained in two successive fields) is 200,000 picture elements. This fine structure is, of course, depicted in tones of gray.

The color components, considered individually, each have a maximum picture signal frequency of about 2 megacycles. In the dot-interlace type of transmission each cycle produces one picture element. Moreover, in accordance with the dot-interlace technique, all the dots in any one color are laid down in four consecutive fields, or in one-fifteenth of a second. When account is taken of the portion of the image blanked off, this time is reduced to one-twentieth of a second. Consequently 2,000,000 green dots are scanned per second, or 100,000 green dots during the complete color picture period. Thus, nominally, the resolution in each color is one-half that of the black-and-white image.

Actually the resolution in the individual primary colors is not as high as 100,000 dots because there is a certain amount of dilution of each color by the other two colors. This dilution occurs because the signal corresponding to one color dot overlaps that corresponding to the adjacent color dot by about 50 percent. This phenomenon, known as "cross-talk," has the effect of causing a part of the color values to combine into shades of gray, much in the manner of the mixed-highs portion of the image. The net effect is that details of width from one to eight picture elements are reproduced in shades of gray, whereas all larger portions of the image are reproduced in their component colors.

As indicated in section 12, chapter 2, the superimposed fine detail in the mixed-highs method of transmission provides a substantial economy in the use of the channel, without appreciable degradation of the color or tonal values of the image. In theory, therefore, the resolution of the RCA system is equal to that of the black-and-white system. It should be noted, however, that the tricolor tubes demonstrated had a resolution of 117,000 picture elements, rather than the 200,000 elements of which the system is theoretically capable. This limitation was imposed by the number of phosphor clusters on the screen and perforations in the metal plate which could be accommodated in the tube. Refinements in the design and construction of the tricolor tube may remove this limitation in the future.

In passing it may be mentioned that the tubes as demonstrated were laboratory models of a special design which may involve considerable difficulty in adapting to factory production. At present one of the most urgent needs of all color television systems is for a three-color receiver tube adaptable to quantity production. Besides RCA a number of others are known to be actively engaged in seeking solutions to this important problem, notably Dr. E. O. Lawrence, of Berkeley, Calif., and Dr. C. W. Geer, of Los Angeles, Calif.

Flicker-brightness relationship (sec. 14 (b)).—The large-area flicker-brightness performance of the RCA system is equal to that of the black-and-white system, since the systems employ the same field rate, 60 per second. The small-area performance is inferior to that of the black-and-white system, however, since a given picture element is scanned in all colors at the comparatively slow rate of 15 per second. Accordingly interdot and interline flicker are present at lower light levels than are the corresponding small-area flicker effects in the black-and-white image.

In early demonstrations of the RCA system a prominent form of dot crawl was evident along vertical or nearly vertical boundaries in the image. In later demonstrations, the geometry of the dot scanning had been altered to minimize this effect, and dot crawl was not then evident.

Continuity of motion (sec. 14 (c)).—Since the field scanning rate of the RCA system is equal to that of the black-and-white system, the continuity of large objects in motion is the same. The continuity of small objects (of the dimensions of a few picture elements) is adversely affected by the low color-picture rate of 15 per second. This shortcoming is inherent in the dot-interlace system, and is parallel to the small-area effect noted in section 23, chapter 4, as applying to the dot-interlaced version of the CBS system.

Compatible nature of RCA system (sec. 13).—Since the line and field scanning rates of the RCA color system are identical to those of the black-and-white system, the two systems are compatible so far as scanning goes. Consequently a black-and-white rendition of RCA color transmission can be received on existing and future sets designed for black-and-white reception only, without change in the scanning circuits of these receivers. Moreover, the presence of the mixed-highs component in the color transmission assures high resolution in the black-and-white rendition. The black-and-white rendition of the RCA color transmission has higher resolution and better flicker-brightness performance than do the black-and-white renditions of the CTI and CBS systems.

Effectivenes of channel utilization (sec. 14 (d)).—The RCA system makes highly effective use of the channel because it employs both the principal spectrum-saving techniques—dot-interlace scanning and mixed-highs transmission.

Color fidelity (sec. 14 (e)).—As noted elsewhere in this report, proper choice of mirrors, filters, and phosphors permits the RCA system to achieve satisfactory color fidelity. However, if color balance and accurate superposition of the primary-color images are not maintained, the color fidelity suffers. The color fidelity demonstrated in the RCA system was considered by the committee to be not as satisfactory as that of the CBS system. The larger colored areas in the RCA images were not always uniform in hue and saturation. This may have been caused by differences in the spectral responses of the

three camera tubes. Color distortions noted in small areas are explained by overlapping and cross-talk between the color signals, described above. In the early demonstrations of the RCA system, gradual shifting of colors with time was observed, due to uncontrolled shifts in the relative positions of the interspersed color dots along each line. In the later demonstrations, these shifts were controlled by improvements in the synchronization of the high-speed switch of the receiver, and the colors were then found to be free of such variations with time. (See annex E for results of National Bureau of Standards tests on color fidelity of the RCA system.)

Superposition defects (sec. 14 (f)).—Of the three principal superposition defects—color break-up, color fringing, and faulty registration—only the last is present in the RCA system. Registration is more difficult to maintain in the RCA system than in the other systems. This follows from the fact that three separate camera tubes are used, introducing the possibility of optical and electrical errors in the size, orientation, and congruency of the primary images as transmitted. In the three-tube type of receiver, these possibilities of improper registration are present also in the receiver. In the single-tube receiver, faulty registration may occur between the scanning of the three electron guns, but optical misregistration does not occur.

Depiction of fine detail.—The dot-sequential color system, alone of all sequential systems, can use the mixed-highs method of depicting fine detail. In the RCA dot-sequential system, no color information is transmitted at frequencies above 2 megacycles whereas the fine detail, transmitted by the signal from 2 to 4 megacycles, is shown in shades of gray.

29. Summary

The essential performance characteristics of the RCA system are as follows:

(*a*) The RCA system scanning standards are compatible with the black-and-white scanning standards. Consequently a black-and-white rendition of the RCA color transmission can be received on receivers built for black-and-white reception, without modification of their scanning circuits. Moreover, the characteristics of the RCA color system are such that the quality of the black-and-white rendition may be equal to that of standard black-and-white reception, in resolution and large-area flicker-brightness performance.

(*b*) The RCA color image has an over-all resolution approximately equal to that of the black-and-white system. The finest details are depicted in shades of gray, while larger details are rendered in color. The color transmission has sufficiently fine detail that, when the gray-tone detail is added to it, the apparent resolution of the image as a whole is approximately 200,000 picture elements.

(*c*) The large area flicker-brightness and continuity performance of the RCA system is equal to that of the black-and-white system. The small-area performance in these respects is somewhat inferior, due to the fact that the color-picture rate is 15 per second, half the corresponding rate in the black-and-white system.

(*d*) The color fidelity of the RCA system suffers to a certain extent from uneven color balance in large areas. Overlap and cross-talk between the color components, and faulty registration, affect the color fidelity in small areas.

(e) The effectiveness of channel utilization of the RCA color system is the highest of all the systems discussed in this report.

(f) Existing receivers cannot be converted to color reception in the RCA system, except at a substantial cost.

Chapter 6

Comparison of Systems and Conclusions

30. *Introduction*

To avoid confusion, each of the foregoing three chapters has been confined to a discussion of one of the proposed color systems, with a minimum of comparative comment. The plan of the discussion in each chapter follows the same pattern, however, so it is possible to bring together comparably the data and conclusions on the performance of the three systems. This comparison has been set forth in chart form, in the accompanying "Tabular summary of performance characteristics." Explanatory comments are given below.

31. *Comments on the tabular summary*

The committee is of the opinion that the essential differences among the three proposed color systems are embodied in nine categories, listed alphabetically at the left of the tabular summary, and defined in sections 13 and 14, chapter 2, as follows: Adaptability, color fidelity, compatibility, continuity of motion, convertibility, effectiveness of channel utilization, flicker-brightness performance, geometric resolution, and superposition defects.

This list purposely omits consideration of certain peculiarities of apparatus such as mechanical versus electronic operation of the receiver color-sequence device, limitation of size of image, and limitation of angle of view. These matters once loomed large in the competitive consideration of the systems, but they have become progressively less prominent as the development of the systems has proceeded. It appears, in fact, that all of the systems may use a tri-color tube to advantage, and this fact puts all three systems on a par with respect to all-electronic receiver operation, size of image, and angle of view. Moreover, such differences are not fundamental, either in the transition stage during which color service is introduced to the public or in the long run as the color service consolidates its position.

The performance characteristics listed in the tabular summary, on the other hand, are believed by the committee to be fundamental, either because they reside in the nature of the scanning process, or because (as in the case of adaptability, compatibility, and convertibility) they are matters of importance during the transition from black-and-white service to color service.

Under some of the main characteristics are listed a number of subdivisions. These subdivisions are not necessarily of equal importance; they merely represent items on which system performance displays a significant difference. For example, under geometric resolution, the total number of picture elements per frame is more fundamental than either the vertical or horizontal values of resolution considered separately. To aid the reader, the subdivision believed by the committee to have outstanding importance within each main category is marked with an asterisk (*).

No attempt has been made to place relative emphasis on the main categories, which are listed alphabetically to avoid any connotation of relative importance. The emphasis on main categories must be assigned at the highest level of administrative decision, taking into account the economic, political, and sociological factors, as well as the technical factors, involved.

The difficulty of placing this emphasis can be well illustrated by such questions as: Is compatibility (preservation of existing investment) more important than convertibility (converting existing investment)? How do each of these compare with effectiveness of channel utilization (conservation of the public domain) or geometric resolution (providing the maximum flexibility to program producers in choice of subject matter, range of action, and field of view)? Answers to these vexing questions must be found but they are not properly the concern of technical specialists.

So much for the basis of the listings. Opposite each performance characteristic, the committee has placed a verbal or numerical index to the relative performance of the three color systems. These indices represent technical judgments, based either on evident fact, well-established theory, or on the subjective reactions of the committee members to the demonstrations. For the most part, the basis of the committee's judgments will be found in the preceding chapters of this report. But the subjective reactions are difficult to analyze, and the terms "excellent," "good," "satisfactory," "fair," "poor" are, in the last analysis, merely words on which the committee was able to agree as being most indicative of relative performance. The final column in the table indicates the system whose performance is, in the opinion of the committee, superior in each category or subdivision. Where two systems share a superior position, both are listed in alphabetical order.

It is the belief of the committee (1) that this table, with the accompanying text of the report, provides a sound basis for a technical decision among the three systems, and (2) that the only missing element is the relative weight to be accorded each main category. When such weights are assigned, a preponderance of advantage for one system over the others can be found.

The main conclusions reached by the committee have been stated at the outset, in chapter 1. These favor a color service based on the six-megacycle channel, the service to be limited to one of the sequential systems (dot, line, or field).

32. Comments on Possibilities of Future Developments

This report would not be complete without one additional observation, namely that all the systems are subject to improvement as a result of further technical and operational development. The process of improvement will go on in each system until the decision between them is handed down, so long as the proponents and other members of the industry continue to expend manpower and resources on their development.

However, the prospect for future improvement is not of equal magnitude in each system. This is a matter of evident importance in setting standards, since the standards may be expected to be in use for a long time after their full potential has been realized. The net long-term good to the public is thus greatest in that system which can be expected to reach the highest pitch of performance during the

next few years. Such technical advances, presuming a choice of one system in the immediate future, will be limited to those matters capable of improvement within the framework of the then-established standards.

It is the opinion of the committee that the CBS system has progressed furthest toward full realization of its potentialities, within the confines of the field-sequential system. It is not likely, for example, that the color fidelity will improve beyond the highly satisfactory state now achieved. Equally, the CBS system is not likely to improve substantially its channel utilization beyond that achieved in the dot-interlaced version of the system. Nor is the flicker-brightness performance capable of substantial improvement, except by methods equally available to other systems, once the picture rate is established at 24 color pictures per second.

The CTI system, being less fully developed, has somewhat greater possibility of future improvement, particularly with respect to correction of faulty registration and small area color distortions, and the development of convertible receiver circuits using a tricolor tube. But in other respects the CTI system cannot reasonably be expected to overcome certain inherent limitations imposed by the choice of scanning method. These include the difficulty of avoiding interline flicker and the impracticability of using dot interlace (at a color picture rate of 5 per second, which is too low for satisfactory rendition of small areas and sharp edges).

The RCA system also has considerable opportunity for improvement within the confines of the scanning standards proposed for this system. The registration of the color images, and the balance of the color values in both large and small areas can be expected to improve substantially with advances in camera design. Convertible circuits, to convert existing sets to color, using the tricolor tube and auxiliary components, can be developed.

The systems discussed above are confined to those developed and demonstrated by their proponents, CTI, CBS, and RCA. An additional demonstration of a dot-sequential system was viewed by the committee. The Hazeltine Electronics Corp. demonstrated a technique known as constant-luminance sampling, which considerably reduces the visible effect of noise and interference in a dot-sequential color image. This demonstration also provided conclusive proof of the efficacy of the mixed-highs technique, in that a video channel of 4 megacycles, carrying a mixed-highs, dot-sequential transmission was found to offer substantially the same quality of image as a 12-megacycle channel carrying an equivalent simultaneous color transmission. The committee concludes that the Hazeltine developments are an important contribution to the dot-sequential system.

The present state of development of each system has been reached through the efforts of single organizations working in competition. Once the decision is reached among the systems, all that effort, plus additional effort from other quarters, can be applied to the one system then chosen. It may then be found that the real limit to future progress is that imposed by the nature of the scanning standards, not by present equipment limitations or present relative costs.

On this account, the final conclusion of the committee is that principal importance should be attached to those fundamental capabilities

and limitations which relate to the choice of scanning method. These fundamentals have been discussed at length in this report and listed in detail in the tabular summary. Other factors, relating to the present performance and costs of apparatus, deserve consideration, but, in the opinion of the committee, such matters should take second place in the technical assessment of the systems.

Respectfully submitted.

E. U. Condon, *Chairman.*
S. L. Bailey.
W. L. Everitt.
D. G. Fink.
Newbern Smith.

Tabular summary of performance characteristics

Performance characteristic	System					Superior system
	Standard black-and-white	CTI color	CBS color		RCA color	
			Line-interlaced	Dot interlaced		
Adaptability		Not needed	Adaptable	Adaptable	Not needed	CTI; RCA.
Color fidelity:						
*Large areas		Satisfactory	Excellent	Excellent	Satisfactory	CBS.
Small areas and edges of objects		Fair	do	do	Fair	CBS.
Compatibility: Quality of image rendered on existing sets		do	Not compatible	Not compatible	Excellent	RCA.
Continuity of motion:						
*Large objects	Excellent	Good	Good	Good	Good	(All comparable)
Small objects	Good	Fair	do	Fair	do	CBS (line); RCA.
Convertibility		Not easily convertible at present.	Convertible 12½-inch tube diameter maximum.	Convertible 12½-inch tube diameter, maximum.	Not easily convertible at present.	CBS.
Effectiveness of channel utilization	Good	Good	Satisfactory	Good	Excellent	RCA.
Flicker-brightness relationship:						
*Large areas	Excellent	Excellent	Good	do	do	CTI; RCA.
Small areas	Good	Fair	do	Satisfactory	Good	CBS (line); RCA.
Interdot flicker	Absent	Absent	Absent	Fair	Fair	CTI; CBS (line).
Interline flicker	Good	Poor	Good	Good	Good	CBS; RCA.
Geometric resolution:						
*Number of picture elements per color picture	200,000	200,000	83,000	166,000	200,000	CTI; RCA.
Vertical resolution	490 lines	490 lines [1]	378 lines	378 lines	490 lines	RCA.
Horizontal resolution	320 lines	320 lines	185 lines	370 lines	320 lines	CBS (dot).
Superposition performance:						
*Registration		Fair	Excellent	Excellent	Fair	CBS.
Color breakup		Excellent	Satisfactory	Satisfactory	Excellent	CTI; RCA.
Color fringing		do	do	do	do	CTI; RCA.

*See explanation on p. 36.

NOTE 1.—This is the geometric resolution; the apparent vertical resolution is considerably less, due to interline flicker.

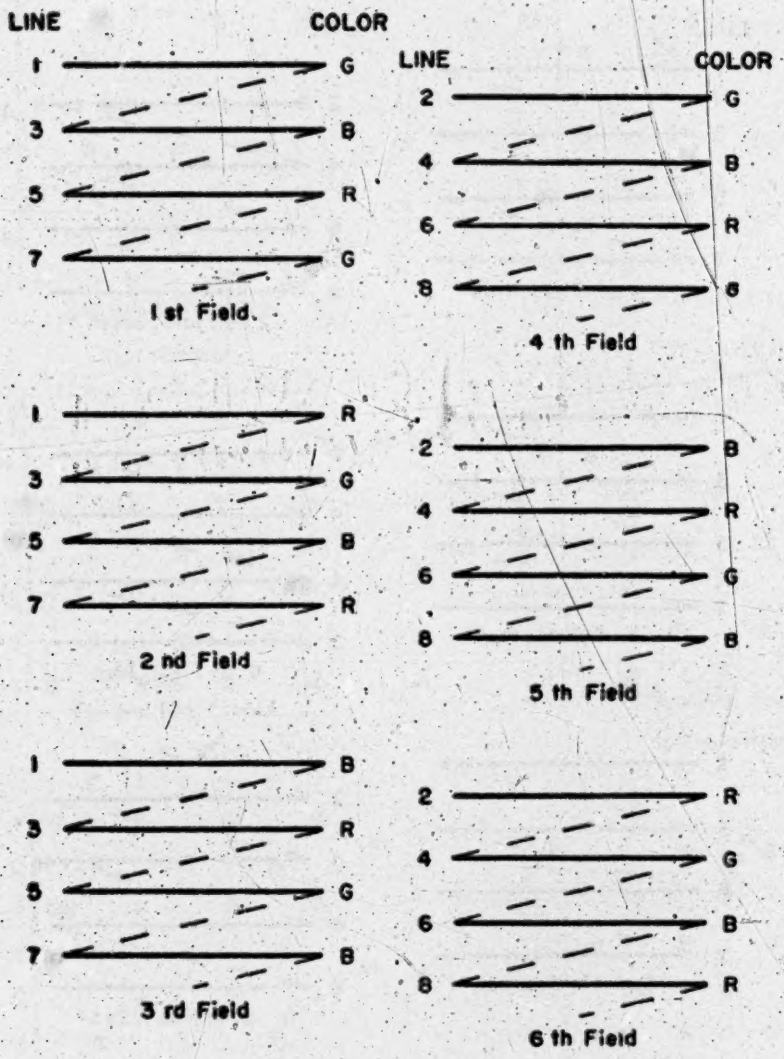


Figure 1. Scanning pattern for CTI line sequential color television system
(Only first eight lines of the fields are shown.)

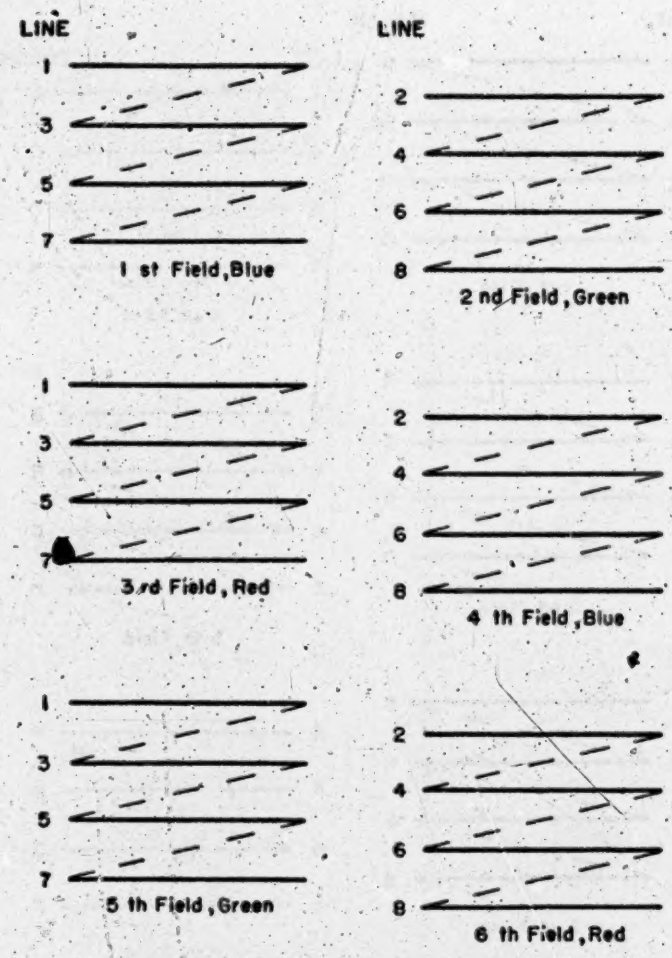


Figure 2. Scanning pattern for CBS field sequential color system line interlaced (Eight lines shown)

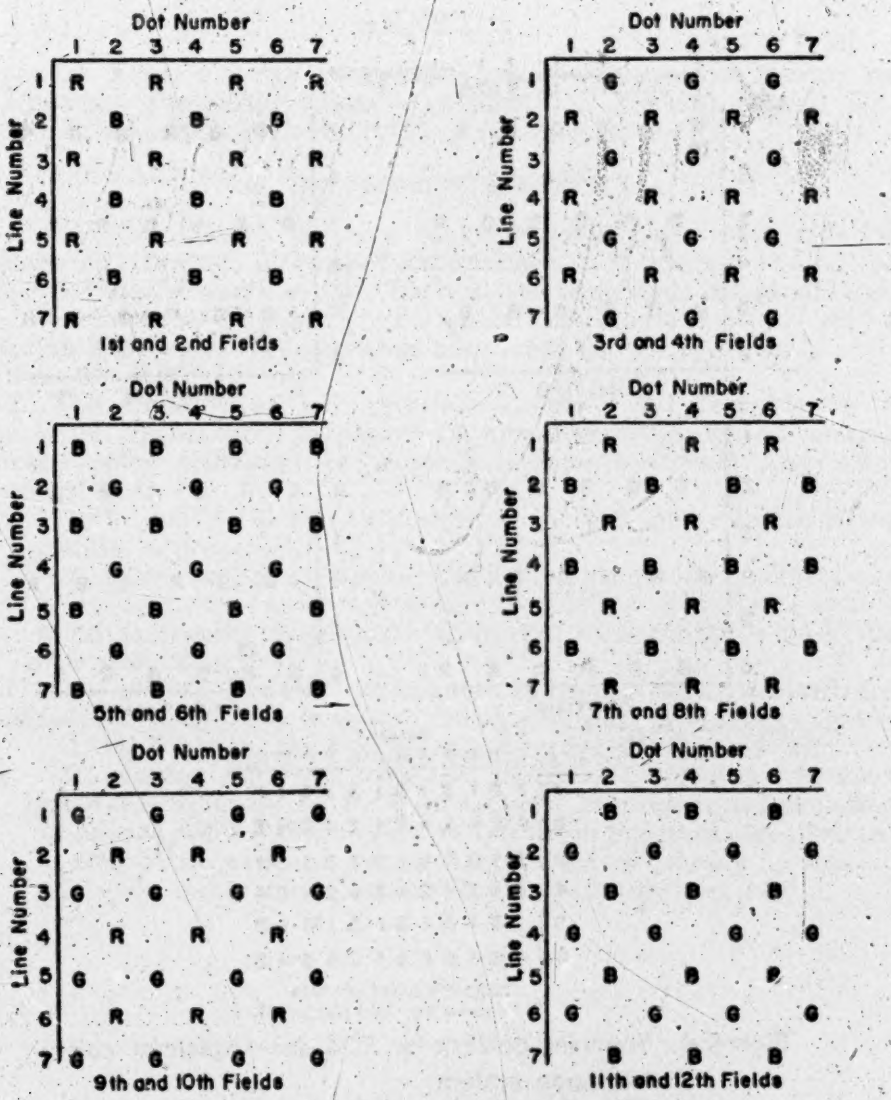
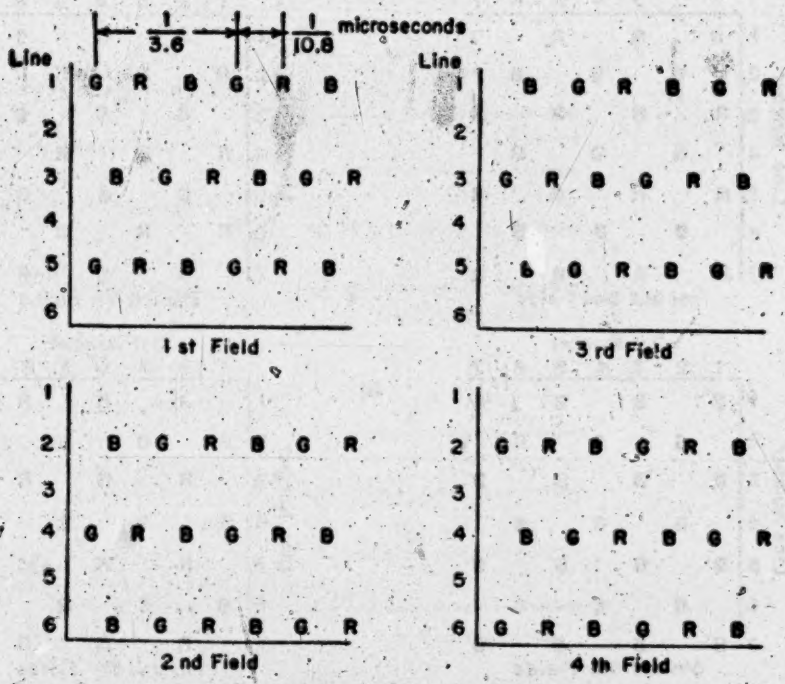


Figure 3. Scanning pattern for CBS field-sequential color system, dot interlaced (Seven lines and seven dots shown)



color

Line	G	B	R	G	B	R	G	B	R	G	B	R
1	1	3	1	3	1	3	1	3	1	3	1	3
2	4	2	4	2	4	2	4	2	4	2	4	2
3	3	1	3	1	3	1	3	1	3	1	3	1
4	2	4	2	4	2	4	2	4	2	4	2	4
5	1	3	1	3	1	3	1	3	1	3	1	3
6	4	2	4	2	4	2	4	2	4	2	4	2

complete color picture
(figures are field numbers)

Figure 4. Scanning pattern for RCA dot-sequential color-television system
(Only first six lines of fields are shown)

ANNEX A

EXCERPT FROM FEDERAL COMMUNICATIONS COMMISSION NOTICE OF FURTHER PROPOSED RULE MAKING (FCC 49–948, MIMEO NO. 37460, ADOPTED JULY 8, 1949), APPENDIX A

II. TRANSMISSION STANDARDS

A. The Commission proposes that the transmission standards for channels 14 through 55 as well as for channels 2 through 13 shall be those standards which are set forth in the Standards of Good Engineering Practice Concerning Television Broadcast Stations under heading 2 entitled "Transmission Standards and Changes or Modifications Thereof."

B. The Commission will give consideration to proposals for a change in transmission standards on channels 2 through 55 looking toward color television or other television systems. Any such proposal shall—

1. be specific as to any change or changes in the transmission standards proposed; and
2. shall contain a showing as to the changes or modifications in existing receivers which would be required in order to enable them to receive programs transmitted in accordance with the new standards.

C. It is proposed to consider changes in transmission standards for channels 2 through 55 only upon a showing in these proceedings that—

1. such system can operate in a 6-megacycle channel; and
2. existing television receivers designed to receive television programs transmitted in accordance with present transmission standards will be able to receive television programs transmitted in accordance with the proposed new standards simply by making relatively minor modifications in such existing receivers.

ANNEX B

NATIONAL BUREAU OF STANDARDS,
February 2, 1950.

The Honorable EDWIN C. JOHNSON,
Senate Office Building, Washington, D. C.

DEAR SENATOR JOHNSON: Herewith for your information is a report drafted by our color-television committee. This report deals only with some aspects of the frequency-allocation problem rather than with color-television systems as such. As I have indicated, we shall probably not have a report on color systems until sometime after the Federal Communications Commission demonstrations have been concluded.

The subject of the present report is, however, pertinent to the general television problem and represents the considered opinion of our committee regarding the frequency-allocation problem. I believe you and the members of your committee may find this material helpful.

The report assumes a knowledge of the general set-up of the frequency-allocation structure in this country, and does not contain much background material on this. If you think that a more general background statement might be of assistance to the members of your committee in considering this problem, we should be glad to furnish one.

I have marked this report "confidential" only to insure that it would not be released unless and until you wish. If you do not advise me to the contrary, I shall do the same with other reports also.

Sincerely yours,

E. C. CRITTENDEN, *Acting Director.*
For E. U. CONDON, *Director.*

STATEMENT BY THE SENATE ADVISORY COMMITTEE ON COLOR TELEVISION

The plans for expansion of the television service, whether for additional black-and-white stations or for a color service, must be evaluated in terms of the radio spectrum now reserved for television and other services. Television broadcast stations are currently allocated in 12 channels in the VHF spectrum in the following bands: 54–72 megacycles, 76–88 megacycles, 174–216 megacycles.

In expanding the television service it would appear to this committee that it would be highly advantageous to allocate additional VHF channels between 72 and 300 megacycles. But the space in the VHF spectrum is currently occupied by, or nominally allocated to, other services. These are—

	Megacycles
Government aeronautical navigation and non-Government fixed	72–76
FM broadcasting	88–108
Aeronautical navigation and communication	108–144
Amateur	144–148
Aeronautical communication	148–152
Police	152–156
Nongovernment fixed and mobile	156–162
Government fixed and mobile	162–174
Government fixed and mobile	216–220
Amateur	220–225
Government aeronautical communication and navigation	225–400

In view of this extensive occupancy of the VHF spectrum by non-television services, the FCC allocated a portion of the UHF spectrum, from 475 to 890 megacycles, for experimental television service, looking toward the development of improved television systems, including high-definition black-and-white and color systems. The FCC has recently issued a proposal to allocate a large segment of the UHF band to commercial black-and-white television broadcasting. The proposal, to be debated shortly in hearings before the Commission, is to allocate approximately 42 channels, each 6 megacycles wide, extending from 475 megacycles to 727 megacycles (or from 500 to 752 megacycles, if the band 475–500 megacycles is allocated to common-carrier fixed-mobile communications).

The proposal to allocate UHF channels is open to a number of serious objections which stem from differences in the performance of transmitters and receivers and in the propagation of radio waves. The available power of transmitters and the sensitivity of receivers are lower, in any given state of the art, in the UHF band than in the VHF band. The performance of the UHF system is impaired further than the VHF system by natural impediments to transmission over the earth's surface. These technical factors have important implications, which may be summed up in the statement that UHF television stations cannot cover as large an area (by a factor of the order of three times) as can VHF stations of the same effective radiated power.

The effect on the extent of the service to the public is manifest. In the first place, areas which might be covered by VHF stations cannot be covered by the same number of UHF stations. A second effect of a UHF allocation which is against the public interest is the tendency to foster monopoly. In areas of dense population, such as the eastern seaboard, a VHF station can reach an audience much larger than can an equivalent UHF station. Accordingly there is serious doubt that a UHF station could, under these circumstances, compete with the VHF stations in the same area. The limited number of stations on the existing 12 VHF channels would then operate at a substantial competitive advantage.

These disadvantages of a UHF allocation may have to be faced, provided that no additional VHF channels can be found. But to the extent that space in the VHF spectrum could be transferred to the television service from other services, the technical, social, and economic shortcomings of UHF television service could be obviated. All the future needs of television may not be satisfied by additions to the VHF allocation. But with even a small addition (e. g., 6 channels) it is possible that an adequate public service can be achieved, both as to coverage and for fostering competition, without the necessity of the extensive UHF allocation proposed by the FCC.

This committee is concerned primarily with the technical factors underlying a color-television service, and is not in a position to recommend specific changes in the VHF allocation. Moreover, the committee wishes to emphasize that the transfer of spectrum facilities from one service to another involves judgments which transcend technical factors. Such judgments must be based on sound technical knowledge, but they involve also the far more difficult determination of the needs of the various services, their established positions and investments, and the quantity and quality of the service they render to the public and the national security. No technical group can

properly undertake judgments of the latter type. They must be made on a high administrative level, by a group of judicial merit, having knowledge of, and properly responsive to, the needs of all the radio services.

It is the considered opinion of this committee that the distribution of the VHF and UHF regions of the spectrum to various services has not been carried out in the past on the basis just suggested. This failure has stemmed from the fact that no Government agency has been given the authority or responsibility to make a judicial review of the use of the entire portion of the spectrum involved. Two groups, operating with different procedures and policies, have been responsible for the main features of the allocation. These are the FCC, which allocates frequencies to non-Government services, and the IRAC (Interdepartment Radio Advisory Committee) which allocates frequencies to Government, including military services and, in addition, allocates frequencies for assignment by the FCC to non-Government services. These groups have not operated, during peacetime, under a common policy and the IRAC has not reviewed, in the manner employed by the FCC for non-Government requirements, the needs of all Government and non-Government services. Unless and until such a review is carried out, at an administrative level sufficiently high to command the respect and cooperation of the industries and Government departments affected, serious doubt will remain that the allocations, as they now stand, are for the maximum benefit of the public and the national security.

While this situation exists, this committee is faced with a difficult choice in its deliberations. It may assume, on the one hand, that a review of the allocations to both Government and non-Government services should be made, and will in fact be made by an appropriate Government agency existing or to be set up, before the proposed expansion of television facilities takes place, and that such a review would probably result in the allocation of additional VHF channels. Alternatively it may assume that the creation of an administrative body to review the allocations, its deliberations and the preparation of its findings, would take so much time that the expansion of television service should not be delayed so long. In the latter event, the committee has no alternative but to proceed within the terms of reference now proposed by the FCC, even though these terms may be faulty.

Since the members of the committee believe this to be a matter of great importance, not only to the future of the television service, but of other radio services as well, they respectfully bring the matter to the attention of the Senate Interstate Commerce Committee and request guidance in the matter.

ANNEX C

UNITED STATES SENATE,
COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
February 22, 1950.

Mr. E. C. CRITTENDEN,
Acting Director, National Bureau of Standards,
Washington D. C.,

MY DEAR MR. CRITTENDEN: This will acknowledge receipt of your letter of February 2, to which was appended two copies of a statement by the Bureau of Standards' special Senate advisory committee on color television, dealing with the question of spectrum allocations for television use. We are most grateful for this statement in which you assert that the proposed allocation appears to pose a problem for your committee in its ultimate findings. You ask for guidance therefore as to whether your committee should make its report on the basis of the existing proposed utilization of both VHF and UHF channels, or whether it should report on the assumption that additional channels contiguous to the present VHF television channels will be allocated.

I have delayed a reply to your letter anticipating developments which might clarify this basic question. The appointment last week by the President of an over-all Communications Policy Board, directed to study, primarily, the frequency use and allocation problem is designed to correct the situation you describe with respect to the present policy of IRAC frequency determinations.

Nevertheless, it seems to me that the Bureau of Standards committee studying the color question could well make its report on the basis of the proposed allocation of the Federal Communications Commission to employ both UHF and VHF. In fact, it would appear to me that your own findings should not be materially altered by whatever band of frequencies are to be used, since you are concerned primarily with the stage of development that color has reached.

However, your comments with respect to the proposed allocations are extremely interesting and they raise the question as to whether it would not be wise for a Bureau of Standards committee to examine just what are the possibilities of eventual use of the frequencies from 72 megacycles to 300 megacycles for additional television channels. Such a study should be made independently of the color study just as the Federal Communications Commission has separated the two items and, it would seem to me, should concern itself primarily with the degree of use that has been made by the various Government services of all, or a substantial part, of these frequencies. In short, to what extent have equipments been engineered for the use of these frequencies by such service as "Government aeronautical fixed" and to what extent, by large contract orders for equipment, have the Government services committed themselves to the use of these frequencies. At the same time, my suggested study might well

include exploration of the UHF frequencies, based on propagation surveys already made or being made, to determine to what extent it is feasible or practicable to make use of these UHF frequencies for television or for other commercial services. I am aware that considerable experimentation is presently being carried on by industry in this field but it would serve a useful purpose to have an unbiased evaluation by a scientifically expert public agency upon which the Congress might rely for technical information.

I am sure you are aware that originally the Commission made clear that the "permanent home of television" was to be in the UHF and that it was allocating VHF frequencies for television use on a temporary experimental basis. Under this original plan, the Commission is consistent today in exploring the use of the UHF for television. If the Commission were to give consideration to moving it out of the VHF now, the tremendous growth of the art would incur revolutionary adjustments.

Your arguments against operation of television simultaneously in both the VHF and UHF appear to me to be cogent and valid. It is my earnest hope that this issue will be resolved one way or the other, but possibly not until we know more about the probability of moving the other existing VHF services out of that area. Therefore such a study as I have suggested the Bureau undertake would prove vital in future consideration of the problem. In view of the tremendous expenditure of time, money, and energy by agencies of government having superior priority over private users to utilize these VHF frequencies, we should not minimize the obstacles.

Meanwhile, it would appear that your committee should make its color findings on the basis of the Commission's allocation now whatever they may be. The report of February 2, as well as any subsequent reports, should continue to remain confidential.

Very sincerely yours,

ED. C. JOHNSON, *Chairman.*

ANNEX D

Report on Tests of Flicker in Color Television

(By T. H. Projector, National Bureau of Standards)

I. SCOPE OF TESTS

Television receivers, both monochrome and color, are subject to various imperfections symptomatically visible as imperfections of the image viewed on the screen. Among these are a group of imperfections which may loosely be described as flicker. It is the purpose of this report to describe tests made of a particular one of these imperfections: the cyclic variation of the brightness of the image associated inherently with the field and frame frequencies and with the kind of color synthesis and analysis used.

Tests have been made to date on the Columbia Broadcasting System's color television system only. This system is a "field sequential" system with a field frequency of 144 per second and a frame frequency of 24 per second, or 6 fields per frame. The fields are successively red, blue, and green. Because of line interlace, two cycles of the three colors are required to complete a frame. The horizontal sweep frequency is 29,160 per second. The field colors are obtained with a 6-segment wheel rotating at 24 revolutions per second.

II. TEST MATERIAL

One CBS table-model color television receiver was delivered to this Bureau in January 1950 for test purposes. It was equipped with a 7-inch CR tube and a magnifying optic yielding a magnified image of the screen approximately the size of a 10-inch tube screen. This receiver was used for physical measurements of the variation of brightness with time. Some preliminary measurements of subjective flicker were made on this instrument but the main group of measurements were made on one of the SKF console receivers located at the Walker Building, where it was used for public demonstrations. The measurements were made at the Walker Building rather than at this Bureau in order to assure optimum reception conditions and thereby to limit flicker to that which is inherent in the system.

III. PHYSICAL MEASUREMENTS OF BRIGHTNESS VARIATION

To measure the variation of the brightness of the screen with time, an electron multiplier, with a correction filter yielding approximately the ICI "Standard Observer" luminosity response, was used. The field of view of the photomultiplier was limited optically to a square area with sides approximately one-seventh of screen width. The output of the multiplier was amplified and fed into the deflection system of an oscillograph. The sweep frequency of the oscillograph was

adjusted to approximately 24 per second, so that the oscillograph presented a curve of the average brightness of the square portion of the television screen viewed by the multiplier versus time for one complete frame.

The regular CBS broadcast test pattern was used for the test. Curves of all four test pattern colors, red, blue, green, and yellow, were obtained, as was a curve for white. The results are shown in figure 1. It should be noted that the color of the patterns could be altered easily by manipulation of the brightness and contrast controls of the receiver. These were adjusted before photographing the curves to give the best over-all effect, but the results should be considered qualitative only.

It is evident from the figure that the decay time of the phosphor is quite short. The relative vertical spread of the trace near the peaks indicates that the decay time is of the order of a fraction of the time of one horizontal sweep. Evidently then, any small area of the television screen receives periodic sharp pulses of light at intervals of one-one hundred and forty-fourth second. These pulses vary in intensity in accordance with the color composition and brightness of the area and will, on viewing, vary in color because of the interposition of the sequential filters.

IV. SUBJECTIVE FLICKER MEASUREMENTS

Because of the complex way in which the images are formed, previous work on flicker was not considered directly applicable. In addition, while there has been a considerable amount of work done on critical flicker frequencies (the frequency at which flicker vanishes), very little has been done relating to the observer's subjective judgments regarding a given amount of flicker. Accordingly, this part of the test was divided into two parts. First it was necessary to determine a flicker-tolerance scale for the observers used in the test and then to determine where on the scale the observers considered the color television set to be.

A. Flicker-tolerance scale

In order to obtain a flicker-tolerance scale, a flicker box was constructed. This box had an opal glass window of the approximate form of a 10-inch television screen at one end. The window could be illuminated from behind so as to present for view a simulated television screen of uniform adjustable brightness. Through the use of a sector disk, the brightness of the window could be varied cyclically in a simple way, and the frequency of these cycles could be adjusted to any desired value. One-hundred percent modulation was used in this test.

Eight observers were used for this part of the test. They were seated before the box at such distances that the angular subtense of the window for the several observers ranged from about 4° to 6°.

Prior to the test, the observers were asked to set up for themselves a flicker-tolerance scale in five steps as follows:

None: No noticeable flicker.

Noticeable: Flicker present but small enough not to be bothersome.

Appreciable: An obtrusive amount of flicker, although tolerable, even for prolonged viewing.

Objectionable: An amount of flicker which would be intolerable for prolonged viewing.

Painful: An amount of flicker which is immediately intolerable.

The flicker box was adjusted to one of three levels of average brightness, 5, 10, or 20 foot-lamberts. The flicker box was set at random at some value of flicker frequency. The observers viewed the box for 10 seconds and were asked to assign a step value on the flicker-tolerance scale to this setting. The box was then turned off while judgments were recorded and the flicker box set for another flicker frequency. This procedure was repeated until the gamut of frequencies had been run and then the entire procedure was repeated for the other two brightness levels. The room in which the measurements were made was dark throughout.

The results of this test are given in figures 2, 3, and 4. Figure 2 gives the average tolerance scales for all eight observers at the three brightness levels. Figures 3 and 4 give the results of the measurements at 10- and-20-foot-lambert brightness levels for seven individual observers. (These seven were used also in the second part of the test in which the equivalent flicker of the color-television set was located on the scale.)

B. CBS flicker tolerance

The test to determine the tolerance-scale value of the flicker of the CBS color-television system was carried out on January 31, 1950, at the Walker Building, where CBS had set up several SKF receivers for a public demonstration. The flicker box was set up alongside an SKF receiver and the observers were seated in approximately the same relative positions they held for the flicker-tolerance scale test. Eight observers were used in this test, seven of whom participated in the tolerance-scale test also. The room was darkened during this test.

Tests were made on the four CBS test-pattern colors: Red, green, blue, and yellow. The transmission was set to fill the entire receiver screen with one selected color from the test pattern. The brightness level for each color was adjusted so as to obtain approximately the relative viewing conditions prevailing in good reception. The brightness values used were—

	Foot-lamberts
Red	10
Blue	10
Green	18
Yellow	17

After the brightness of the television screen had been adjusted, the brightness of the flicker box was adjusted to the same level with the flicker rate set above the critical frequency. The flicker box was not color-matched to the television screen. With the SKF receiver left undisturbed, the flicker frequency of the flicker box was set successively and at random at various values. At each setting, left on for about 5 seconds, the observers were asked to judge which flickered more, the flicker box or the television set. After the 5-second comparison period, the flicker box was turned off and the judgments recorded. This procedure was repeated for all four colors.

The value of flicker-box flicker frequency at which the observer's judgments reversed was considered to be the equivalent flicker frequency of the color-television set for that color at the set brightness

level. The equivalent flicker frequencies for the four colors are shown in figure 2 underneath the flicker-tolerance scale for the nearest brightness level. The results for seven individual observers are shown in figures 3 and 4.

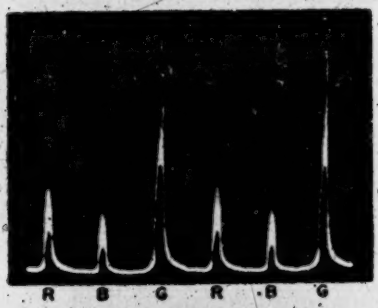
V. DISCUSSION

It may be seen in figure 2 that the flicker of the CBS television set was classed as "Noticeable" according to the flicker tolerance scale set-up. At the higher brightness, the flicker was near the "Appreciable" end of the "Noticeable" region. At the lower brightness, the flicker was near the critical frequency. The judgments as to the tolerance of flicker seem to be more affected by the brightness level than by the particular color viewed.

The conditions of this test were relatively severe. The use of a field of uniform color completely devoid of subject interest or variety and the direction of the attention of the observers to the specific subject of flicker undoubtedly gave what flicker there was more prominence than it would have for the ordinary television program viewer. It is therefore evident that the amount of flicker inherently present in the CBS color television system, while noticeable, is unobjectionable.

The assistance of Dr. D. B. Judd and Mr. C. A. Douglas of the National Bureau of Standards in these tests is gratefully acknowledged.

COLOR TELEVISION TEST
BRIGHTNESS VS. TIME CURVES
CBS TEST PATTERN COLORS



White

Each record represents a sequence of six fields making a complete frame. The letters R, B, and G indicate red, blue, and green sequential fields. The field of view in these measurements was restricted to a square area with sides of length approximately 1/7 of screen width.



Red

Blue

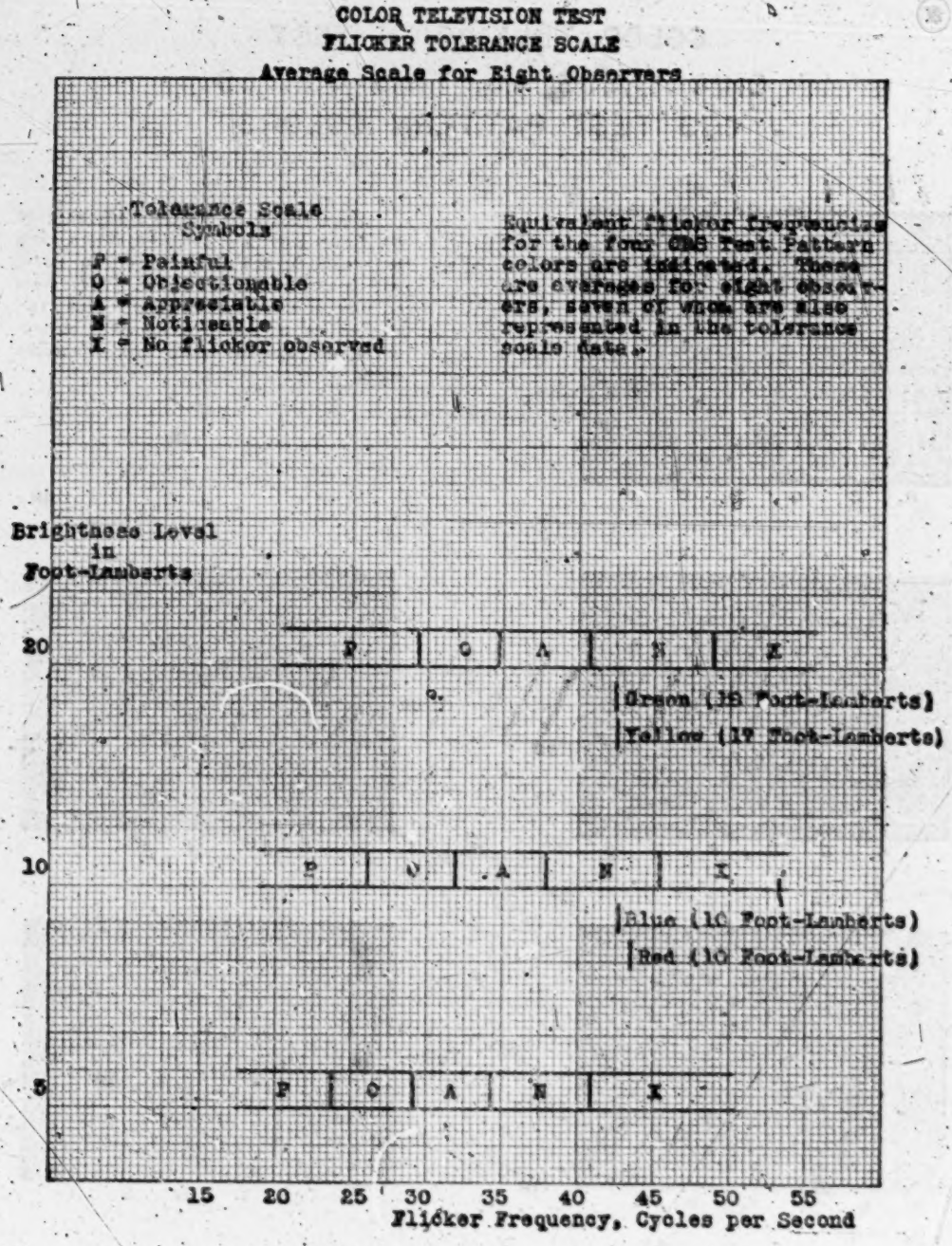




Green

Yellow

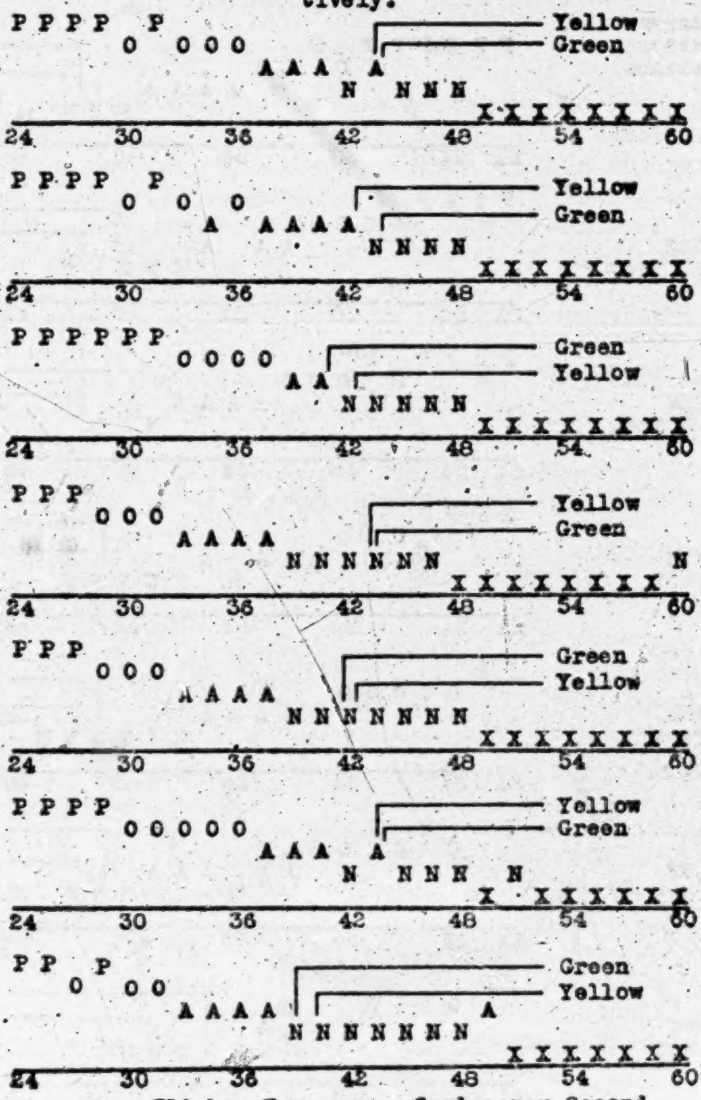



COLOR TELEVISION TEST
FLICKER TOLERANCE SCALE
Average Scale for Eight Observers
Tolerance Scale Symbols
P = Painful
O = Objectionable
A = Appreciable
N = Noticeable
X = No flicker observed
Equivalent flicker frequencies for the four CBS Test Pattern colors are indicated. These are averages for eight observers, seven of whom are also represented in the tolerance scale data.
Brightness Level in Foot-Lamberts
20
10
5
P
O
A
N
X
Green (18 Foot-Lamberts)
Yellow (17 Foot-Lamberts)
Blue (10 Foot-Lamberts)
Red (10 Foot-Lamberts)
15 20 25 30 35 40 45 50 55
Flicker Frequency, Cycles per Second

COLOR TELEVISION TEST
FLICKER TOLERANCE SCALE DATA
Brightness Level = 20 Foot-Lamberts

Tolerance Scale Symbols
P = Painful O = Objectionable
A = Appreciable N = Noticeable
X = No Flicker Observed

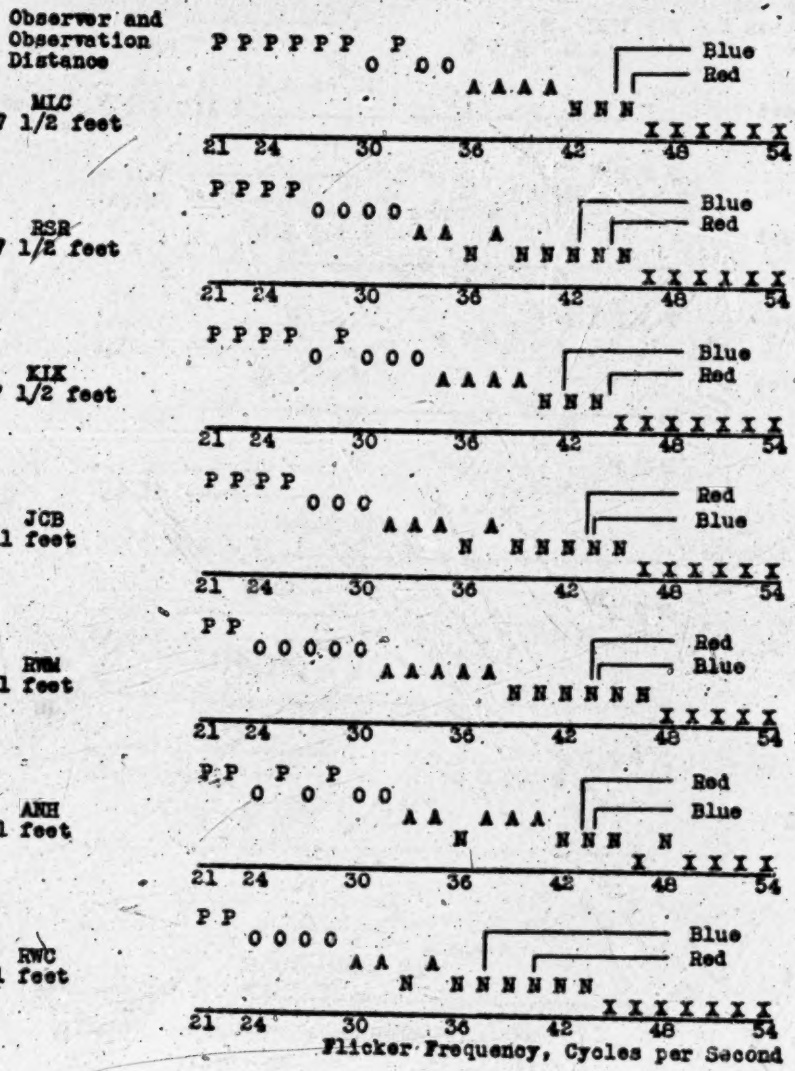
Equivalent flicker frequencies for two CBS Test Pattern colors are indicated. Brightness levels for green and yellow were 18 and 17 foot-lamberts, respectively.



COLOR TELEVISION TEST
FLICKER TOLERANCE SCALE DATA
Brightness Level = 10 Foot-Lamberts

Tolerance Scale Symbols
P = Painful O = Objectionable
A = Appreciable N = Noticeable
X = No Flicker Observed

Equivalent flicker frequencies for two CBS Test Pattern colors are indicated. Brightness level for both was 10 foot-lamberts.



ANNEX E

Report on the Fidelity of Color Reproduction by the CBS and RCA Systems

(By Deane B. Judd, L. Plaza, and M. M. Balcom, National Bureau of Standards)

I. INTRODUCTION

The question has been raised as to how faithfully can present-day systems of television in color reproduce the colors of the actual scene. How does this color reproduction compare with that in the graphic arts and in color photography—systems that already have consumer acceptance? This report compares the color fidelity achieved by the CBS and RCA systems in January and February of 1950 with that of color photography by the Kodachrome process.

An unfaithful reproduction of color can result in television from various types of failure:

(*a*) Failure to equip the camera with filters giving it the proper spectral sensitivity to control the receiver primaries.

(*b*) Improper adjustment of the camera resulting in its failure to initiate the proper signals to control the receiver primaries.

(*c*) Improper adjustment of the transmitter resulting in failure to broadcast the proper signals.

(*d*) Failure of the proper signals to arrive at the receiver due to various forms of interference to propagation of radio waves, superposition of extraneous signals, etc.

(*e*) Improper adjustment of the receiver.

Perfect reproduction of the colors of the scene is theoretically possible provided those colors lie within the gamut of colors producible by additive combination of the receiver primaries. An unfaithful reproduction of color from the above causes is said to come from poor color control or poor color balance. This report indicates the degree of color balance achieved by certain transmitter-receiver combinations operating in January and February of 1950 on the CBS and RCA systems. It does not indicate the ultimate color fidelity possible with those transmitter-receiver combinations, nor that theoretically possible by means of the CBS and RCA systems of color television in color, nor does it seek to point out the particular link of the system responsible for specific instances of unfaithful color reproduction. It is not a measure of the bad effects of misregistration of images, color fringing, or color breakup. It is simply a record of the color fidelity achieved at certain times by the CBS and RCA systems of color television.

II. METHOD

The method was to measure the colors of two test charts, each having four colors plus white; then to measure the rendition of these colors on the tube of the television receiver; then to compare the

relationship of these eight rendered colors to the rendered white with the relationship between the eight actual colors to the actual white.

(*a*) *Test charts.*—Each chart (18 by 24 inches) consisted of four colors covering the quadrants of a rectangle except for a central rectangle covered with white. Table 1 shows the Munsell notations of the nine colors, first estimated by visual comparison with the color scales in the Munsell Book of Color,[1] and second found by means of the colorimeter used to measure the colors produced by the television receivers.

(*b*) *Colorimeter.*—A special colorimeter for measuring the colors of self-luminous areas was assembled for this test. In this colorimeter one-half of the field of the Martens photometer was filled with light from the test area; the other half was filled with light from an incandescent lamp (standard illuminant A) filtered through a combination of Lovibond glasses (red, yellow, blue) adjustable in number of Lovibond units.[2] A double-cell liquid filter (Davis-Gibson)[3] converting illuminant A to illuminate C (representative of average daylight) could also be inserted. For each combination of filters and setting of the Martens photometer the luminance, Y, and chromaticity coordinates, x and y, are known by means of calibration graphs.

For each chart under illuminant C and for each rendition of each chart on the screen of the television receiver measurements were made of the luminance, Y, and chromaticity coordinates[4], x and y, of the white area, and of the four test colors.

(*c*) *Reduction of data.*—From the measured values of Y, x and y, for each area, the tristimulus values, X, Y, Z, were computed by the formulas:

$$\begin{aligned} X &= x(Y/y) \\ Y &= Y \\ Z &= z(Y/y) \end{aligned} \qquad (1)$$

These tristimulus values, X, Y, Z, were then adjusted by constant factors so that the white area had the values $X'=0.847$, $Y'=0.864$, $Z'=1.020$, characteristic of a nonselective white surface of luminous reflectance, 0.864 illuminated by standard source C thus:

$$\begin{aligned} X' &= k_1 X \\ Y' &= k_2 Y \\ Z' &= k_3 Z \end{aligned} \qquad (2)$$

where k_1, k_2, and k_3 are the factors constant for each rendition of each chart.

From the tristimulus values, X', Y', Z', the adjusted chromaticity coordinates, x' and y', were computed:

$$\begin{aligned} x' &= X'/(X'+Y'+Z') \\ y' &= Y'/(X'+Y'+Z') \end{aligned} \qquad (3)$$

From the values of Y', x', and y', the Munsell renotations of the colors were read by interpolation on the graphs in the Final Report of the OSA Subcommittee on the Spacing of the Munsell Colors.[5]

[1] Munsell Book of Color, standard and pocket editions (Hoffman Bros., Baltimore, Md., 1929 and 1942). Available also through the Munsell Color Co., 10 East Franklin St., Baltimore Md.

[2] K. S. Gibson and E. K. Harris, The Lovibond color system, BS Sci. Paper No. 547 (1927).

[3] R. Davis and K. S. Gibson, Filters for the reproduction of sunlight and daylight and the determination of color temperature, Misc. Pub. BS, No. 114 (1931).

[4] D. B. Judd, The 1931 ICI standard observer and coordinate system for colorimetry, J. Opt. Soc. Amer. 23, 359 (1933).

[5] S. M. Newhall, D. Nickerson, and D. B. Judd, Final report of the OSA Subcommittee on the Spacing of the Munsell Colors, J. Opt. Soc. Amer. 33, 385 (1943).

In Munsell terms, the first symbol (such as 6R) indicates the Munsell hue, the second symbol (such as 5.0/) the Munsell value, and the third symbol (such as /10) the Munsell chroma, the whole notation being written 5R 5.0/10; see table 1. The Munsell system is useful for assessing the importance of the difference found between the actual colors and the rendition of the colors because of two properties: First, the Munsell scales have steps that are visually uniform; second, for usual observing conditions Munsell chroma correlates with the perceived departure of the color from gray; Munsell value correlates with the perceived lightness or darkness of the color; and Munsell hue correlates with the perceived hue. It has been found that unfaithful reproduction of hue is more objectionable to the public than much more easily perceptible discrepancies either in lightness or in saturation (departure from gray).

The final step therefore, is to find by subtraction the difference in Munsell hue between actual chart color and the rendered color, and the corresponding difference in Munsell value.

III. TESTS MADE

At the request of the Senate Advisory Committee on Color Television the following tests were made:

CBS system

Three tests on an RCA receiver, 7-inch tube with color converter and lens, called the dual receiver at this Bureau, brightness and contrast controls adjusted by us to give as close a duplication of the test chart as possible. Test charts illuminated by 4,500° white fluorescent lamps in the studios of WTOP in the Warner Building.

Two tests on a Smith, Kline, and French medical receiver built by Zenith and located in the Walker Building, Washington, D. C. Receiver (called Zenith receiver) adjusted by CBS engineers to give what they considered to be the best possible picture. First test with transmitter adjusted to make the receiver rendition of the white area of the test chart color-match light from a daylight fluorescent lamp.

RCA system

One test on a large cabinet, three-tube receiver, and one test on a smaller so-called high-level three-tube receiver such as used at the Laurel demonstration before the Federal Communications Commission, both tests made at this Bureau. In both tests the receivers and the transmitter were adjusted for the best possible rendition of the test charts by RCA engineers. Test charts were illuminated by incandescent-lamp light in the studios of WNBW in the Wardman Park Hotel.

Color photography by the Kodachrome system

Photographs on stock 8- by 10-inch Kodachrome film were made of the two test charts at this Bureau by the Photographic Technology Section on February 6. The charts were illuminated by light from 4,500° white fluorescent lamps. One pair of pictures was underexposed, one was exposed for the time interval suited to the illumination, and one was overexposed. The film was sent to Eastman Kodak Co. for processing and on being returned was illuminated as a

transparency by standard illuminant C and the colors measured in the same way as those produced by the television receivers.

IV. RESULTS

Table 2 shows the dates of the various tests, identifies the system of color television and the receiver tested, indicates the adjustment of the transmitter and the receiver, and gives the average discrepancy between test color and the rendition of it in terms of Munsell value, Munsell chroma, and Munsell hue. The average deviations in Munsell hue between test color and rendition have been multiplied by the chroma of the color (average of test chart and rendition), the perceptibility, and hence importance, of hue differences being proportional to chroma of the colors being compared.

V. DISCUSSION

It will be noted from table 2 that the CBS and RCA systems of television in color in these instances gave consistently more faithful reproduction (smaller discrepancies, ΔV) in Munsell value of the test colors than the Kodachrome system of color photography. The reverse is true for reproduction of hue, and there is little to choose between the systems in regard to reproduction of Munsell chroma of the test colors.

If an over-all evaluation of color fidelity taking into account all three kinds of color departure (Munsell hue, value, and chroma) is to be given, some estimate of the relative importance of the Munsell hue step, the Munsell value step, and the Munsell chroma step must be made. We believe that in color rendition one Munsell value step is about as important as two Munsell chroma steps or one Munsell hue step at chroma/10. We propose tentatively, therefore, the following index of color fidelity, F:

$$F = 100\,[1 - (\overline{C}\Delta H/5 + 2\Delta V + \Delta C)/30] \qquad (4)$$

The last column of table 2 gives values of color fidelity, F, computed from the averages of $\overline{C}\Delta H$, ΔV, and ΔC, from this formula. It will be noted that the color fidelity achieved by the CBS system in these tests is about the same as that achieved by the Kodachrome system of color photography, and that by the RCA system is not importantly worse.

VI. CONCLUSIONS

(*a*) In January 1950 the CBS system of television in color was found to yield as faithful reproductions in color as is common by Kodachrome photographs. It was at that time sufficiently developed to give trouble-free operation at this level of color fidelity.

(*b*) In February 1950 the RCA system of television in color was found to yield substantially as faithful reproductions in color as is common by Kodachrome photographs. It was not shown at that time to be sufficiently developed to yield these results without constant expert attention to the receiver.

TABLE 1.—*Munsell book notations of the test colors*

[Illuminant: ICI standard *C*, representative of average daylight]

Color	Munsell book notation	
	Visual comparison to Munsell book of color	Measured by colorimeter
Red	5R 5.3/10	6R 5.4/8.8
Yellow	5Y 9.0/9.0	6Y 9.0/9.3
Purple	6P 4.2/9.5	5P 4.3/9.4
Green	4G 7.0/6.5	4G 7.2/8.3
Flesh	6YR 8.2/6.0	7YR 8.0/5.2
Blue	10B 5.3/8.0	1PB 5.5/7.6
Neutral	N 6.7/	8G 6.8/0.4
Foliage green	5GY 5.4/4.5	6GY 5.8/4.6

TABLE 2.—*Discrepancies in Munsell value, chroma, and hue between test color and rendition of it, also numerical evaluation of over-all color fidelity*

System	Date 1950	Receiver	Transmitter operation	Receiver adjustment	Average discrepancy between test color and rendition of it			Color fidelity, *F*
					ΔV	ΔC	$\overline{C}\Delta H$	
CBS	Jan. 18:							
	10:15	Dual	Normal	By NBS to give best match for charts.	1.15	2.44	17.6	72
	11:45	do	do		.90	1.59	24.5	72
	Jan. 25	do	do		.59	2.56	25.2	71
	Jan. 26	Zenith	do	By CBS to give normal operation.	1.36	2.31	18.9	71
	do	do	White to match daylight.		1.50	2.94	31.9	59
RCA	Feb. 24	Cabinet	Normal	By RCA to give best match for charts.	.64	1.72	41.2	63
	Mar. 2	High level	do		.97	3.64	34.1	59
		Exposure						
Kodachrome	Feb. 6	Under			2.26	2.32	20.5	64
	do	Correct			2.14	2.31	14.1	69
	do	Over			2.25	2.32	18.6	65

[fol. 423] ANNEX D

Radio Corporation of America
RCA Laboratories Division
Princeton, N. J.

C. B. Jolliffe
Executive Vice President
In Charge of
RCA Laboratories Division

July 31, 1950.

Honorable T. J. Slowie, Secretary, Federal Communications Commission, Washington 25, D. C.

DEAR SIR:

There are enclosed 20 copies of "Progress Report of RCA on Color Television and UHF" which was prepared for the information of the radio industry. It is expected that additional reports of this kind will be distributed from time to time. As they are issued, copies will be sent to the Commission for the information of the members and its staff.

If members of the Commission or its staff are interested in obtaining further information on the work referred to in this progress report, I will be glad to furnish it or arrange visits for them to see the work and discuss the results with RCA engineers.

I request that you kindly supply a copy of this report to each member of the Commission.

Very truly yours,

(Signed) C. B. Jolliffe.

[fol. 424] Progress Report of RCA on Color Television and UHF

July 31, 1950

During the hearing on color television (Docket 8736 et al.) RCA through testimony and bulletins kept the Commission and industry informed of the progress of development of the RCA color television system. RCA also indi-

cated that work on certain aspects of the system and its components was continuing. Since the close of the hearing, there has been further substantial progress in various phases of this work, and RCA now presents a report to the industry on these developments.

(A) Tri-Color Tubes

Research work on the RCA tri-color tubes has now progressed to the point where RCA color system receivers utilizing these tubes produce pictures with a highlight brightness of more than 20 ft.-lamberts, with resolution capabilities comparable to those provided by the 6-megacycle television channel, and with dot structure and moire pattern substantially eliminated.

The increase in brightness is due to two factors: (1) the development of an improved red phosphor of proper chromaticity, making it possible to remove the red filter from in front of the tube which increases light output by 2 to 1; and (2) the use of improved tube techniques which give a higher light output, using the same applied voltages as used in the demonstrations in March-April 1950. The increase in resolution is due to the use of color screens which now have approximately 600,000 phosphor dots instead of 351,000 as in the original screens. The elimination of dot structure and moire pattern is due to the use of improved circuits in the receivers which make better use of by-passed "mixed highs".

[fol. 425] Additional research work on the tri-color tube is directed toward a further increase in resolution capabilities, increased brightness, and the construction of shorter tubes. As previously indicated, work on increased tri-color tube resolution will be continued until the number of phosphor dots is sufficient so that the tube resolution capabilities will be substantially in excess of that afforded by the 6-megacycle channel. Results of research work on guns, screens and masks for tri-color tubes indicate that before long there can be a further improvement in brightness of at least 2 to 1 (i.e., of the order of 40-50 ft.-lamberts). The progress thus far in work with larger deflection angles and improved guns makes it appear feasible to construct tri-color tubes of approximately the same length as ordinary black and white kinescopes. Work on the above items, applied both to three-gun and single-gun tubes, is continuing.

Of the substantial number of tri-color tubes thus far made by RCA Victor Division, the majority are being used or are assigned for use in the color receiver program (see (B) below) and the remainder are being used for study, tests and experimental work. It is hoped that the supply of tubes will be such that samples can be made available to the industry in the fall for their own study and development work.

The construction and test of the tri-color tubes to date have given RCA experience that will make it possible to continue to improve the tubes and to adapt them to mass production. RCA Victor Division is continuing its studies and tests along these lines and is working toward pilot line production by January, 1951.

(B) Color Receivers

Receiver circuits have been developed which are simpler and more stable in operation than those used in receivers demonstrated in March-April, 1950. They also make more effective use of the by-passed "mixed highs" principle. [fol. 426] Receivers incorporating these circuits and the latest model tri-color kinescope produce a color picture that has substantially the same resolution and is as stable as the picture produced on a standard monochrome receiver. The operating controls are the same as for black-and-white operation. A maximum of eight tubes and possibly only six, is added to the video circuits of a standard monochrome receiver to produce the color picture. It is, of course, necessary to provide the appropriate power supply and convergence circuitry to obtain proper operation of the tri-color tube. Field test receivers incorporating this design are being constructed and will be available for testing in the Washington area by the end of August.

Other development models of color receivers using the tri-color tube are now being tested in the Washington area. Thirteen receivers have been constructed or are under construction at RCA Laboratories. These receivers, which have various types of circuits, will be used to test operating characteristics to determine the best circuits for pilot line production and to develop information relevant to the manufacture of color receivers.

As originally indicated by General Sarnoff, RCA Victor Division is building tri-color tube receivers in Camden and

expects to have 35 receivers completed by September, with a schedule thereafter for pilot line assembly of five receivers per week.

The color receivers thus being made available will be used to fulfill RCA's testing requirements, to make receivers available to other manufacturers for their own use and investigations and to permit field test installations in homes in the Washington area.

For the immediate future, the color receivers referred to above will use three-gun tri-color tubes of the type previously demonstrated, but with at least a 100% increase in brightness. However, as soon as RCA tri-color tubes with the higher resolution and the new phosphors are available in quantity, they will be used in the receiver program. [fol. 427] Work is also progressing on receivers utilizing the single-gun tri-color kinescope. These receivers now include means for adjusting color balance at the receiver so that the picture produced is comparable with that obtained on receivers using three-gun kinescopes.

(C) Color Studio Equipment

As was previously indicated, RCA is prepared to take orders for studio equipment for experimental use with the RCA color system. At the present time, four complete camera chains are under construction for use within RCA. In addition, orders for 10 flying spot scanning equipments for experimental purposes have been received and the equipments are under construction—two for development laboratories of manufacturers other than RCA and the remainder for laboratories of RCA Divisions and Companies. Inquiries have been received from other manufacturers relative to the purchase of RCA color studio equipment for experimental purposes.

Improved transmitter sampling techniques have been developed. Also, work is in progress on several types of studio and field cameras, including improvements on cameras of the type now in use at WNBW. These improved cameras (which include a camera using a single-image orthicon) use simpler circuits and make more effective use of the "mixed highs" principle. The different cameras are in various stages of development. Testing will be done in the studio of WNBW, Washington, D. C., as the various cameras reach that development stage. It is ex-

pected that at least one of the new cameras will be in operational test in Washington in September, 1950.

New studio cameras are also being built in the model shop at the Princeton laboratories to replace those now in Washington. The new cameras incorporate improved circuits and more nearly approach commercial-type design.

[fol. 428] (D) Equipment for Coaxial Cable Color Transmission

At the present time improved equipment for 2.4 mc. sampling is being installed in Washington for further field test and refinement of color transmission over existing coaxial cable circuits. This equipment will provide, on both color and monochrome receivers, pictures with resolution substantially equivalent to the standard monochrome picture from standard studio equipment when transmitted over 2.7 mc. coaxial cable.

(E) Color Broadcasting

The regular schedule of color broadcasting has continued over WNBW in Washington without interruption. As of July 31, 1950, WNBW has transmitted a total of 1,250 hours of color programs and test patterns. A substantial part of this has been "live" programs produced by the regular program and studio staff of NBC-Washington. All operations are by NBC's regular television personnel. A color consultant has also been engaged to assist in the development of color programming techniques. The experimental UHF station in Washington, KG2XCL, has transmitted 847 hours of color programs and test patterns.

The present color program schedule in Washington consists of 7 hours of studio programs per week, Monday through Friday, and approximately 25 hours per week of color test patterns. Commencing in the fall, this schedule will be extended to include studio programs on Saturday and Sunday as well. To prepare for expansion of the color broadcasting schedule, NBC is proceeding with the training of additional personnel and is equipping additional space for WNBW at the Wardman Park Hotel.

[fol. 429] (F) Oscillator Radiation

RCA is on record by a letter of Mr. Frank M. Folsom, its President, that the problem of oscillator radiation should

be dealt with as a matter of receiver design. RCA has been concerned with and has investigated the problem of receiver oscillator radiation for a number of years and has devised improved circuits to reduce this radiation. For example, in the television receivers announced in July, 1950, RCA has already taken further steps to achieve substantial reduction in oscillator radiation. Further improvements will be made, if possible, in future designs.

As in the past, RCA will circulate to the industry a description of the methods used by RCA in the reduction of oscillator radiation, and the RCA Industry Service Laboratory will continue to assist receiver manufacturers in their attack on the problem.

RCA engineers will continue to work closely with the RTMA and IRE committees. Much assistance and data have already been furnished, particularly with regard to proper and accurate measurement techniques and the standards therefor.

The setup of open field test facilities at RCA Laboratories in Princeton, N. J., for the measurement of oscillator and other receiver radiation has been completed and placed in operation. Already 20 receivers from 10 different manufacturers have been measured and more receivers are coming in daily for measurements. It is felt that these facilities and experience gained in their use will be of benefit to the television industry in the evolution of designs which will conform to appropriate standards and will result in substantial reduction in oscillator and other receiver radiation.

[fol. 430] (G) UHF Bridgeport

The operation of NBC's experimental UHF television station, KC2XAK, Bridgeport, Connecticut, is continuing on a regular schedule, Tuesday through Saturday, from approximately 9:00 A. M. until WNBT signs off at night. These transmissions consist of the reproduction of WNBT's regular scheduled programs and test transmissions. As of July 31, 1950, KC2XAK has operated a total of 2,075 hours.

Over 250 industry representatives, broadcasters, engineers, and others have visited KC2XAK since it has been in operation. They have had opportunity to familiarize themselves with the installation and with the problem of UHF operation in the Bridgeport area. Several receiver

manufacturers have tested development designs of UHF receivers in this area.

The field strength survey in the Bridgeport area has been completed to the point where available data is being analyzed to determine what further measurements are required. Necessary additional data will be taken.

Over 75 UHF receivers and converters have been installed in homes and other locations in the Bridgeport area which have provided information on UHF installation and antenna problems and have given a measure of actual home television performance in the UHF band.

Recordings of the signals from Bridgeport have been made on the roof of the RCA Building in New York (line-of-sight). These recordings, running over three months, have shown very constant signal strength and have produced little new information. Accordingly, the equipment has now been moved to Lynbrook, L. I., for further recordings at a location below line-of-sight and within the 50-mile area of the station.

Recordings have also been made at Riverhead, L. I. for the last six months and at Princeton, N. J. for three months. These show considerable variation in signal [fol. 431] strength and it is planned to continue them through a full year's cycle to obtain information on daily and seasonal variations in signal intensity due to tropospheric effects and other varying conditions of the signal path.

The results of these surveys and recordings are being analyzed and will be included in the regular reports made by NBC in accordance with the requirements of its experimental license. These reports will be circulated to interested parties and presented to the FCC at the time of the allocations hearing.

* * * * * * *

On October 20, 1949, RCA commenced the distribution to the Commission and to the industry of bulletins covering various aspects of its work on color and UHF television. To date fifteen of these bulletins have been distributed, the last two since the close of the hearing. The list of the titles and exhibit numbers of these bulletins is attached.

[fol. 432]

RCA Bulletins on Color Television and UHF

Date	Title	Exhibit Number
10/20/49	A 15 by 20-Inch Projection Receiver for the RCA Color Television System	305
10/31/49	Synchronization for Color Dot Interlace in the RCA Color Television System	306
11/ 9/49	A Two-Color Direct-View Receiver for the RCA Color Television System	307
12/12/49	An Experimental UHF Television Tuner	308
1/ 9/50	A Three-Color Direct-View Receiver for the RCA Color Television System	309
1/17/50	An Experimental Determination of the Sideband Distribution in the RCA Color Television System	310
1/17/50	A Study of Co-Channel and Adjacent Channel Interference of Television Signals, Part I	311
1/30/50	A Study of Co-Channel and Adjacent Channel Interference of Television Signals, Part II	312
1/30/50	An Experimental UHF Television Converter	313
2/ 8/50	Recent Developments in Color Synchronization in the RCA Color Television System	314
2/15/50	Colorimetric Analysis of RCA Color Television System	315
2/28/50	A Simplified Receiver for the RCA Color Television System	316
4/17/50	General Description of Receivers for the RCA Color Television System Which Employ the RCA Direct-View Tri-Color Kinescopes	(Material originally submitted as Exhibit No. 382)
7/28/50	Analysis of the Sampling Principles of the RCA Color Television System	(Material originally submitted in part as Exhibit No. 379
7/28/50	Mixed Highs in Simultaneous Color Television	

[fol. 433]

ANNEX E

Federal Communications Commission

Washington 25, D. C.

May 3, 1950.

Radio Corporation of America, 30 Rockefeller Plaza, New York 20, N. Y.

Gentlemen:

The Commission has announced a television demonstration by CTI to be held in San Francisco, California, on May 17, 1950.

The Commission desires to view a color picture transmitted by the proposed CTI system with relative high

brightness and on a direct viewing device. CTI does not have such a device and the Commission feels that it would be helpful if you could make available to CTI for their use in the above demonstration a direct view receiving device with dichoric [sic] mirrors similar to that used in receivers demonstrated recently by your company.

Very truly yours, (S) T. J. Slowie, Secretary.

CC:

Mr. Joseph Heffernan
Color Television Incorporated
Wheat, May & Shannon

[fol. 434] Affidavit of Service

State of New York,
County of New York, ss.:

Anne Dubivsky, being first duly sworn, upon oath deposes and says:

That she has this day served a copy of the foregoing Comments of Radio Corporation of America upon each of the parties of record in the color part of the proceedings in Docket Nos. 8736, 8975, 9175 and 8976, at the addresses shown below, by regular or air mail, postage prepaid:

Mr. Donald Fink, Joint Technical Advisory Committee, 1 East 79th Street, New York, N. Y.

Burton Wheeler, Esq., Southern Building, Washington, D. C.

Rosenman, Goldmark, Colin & Kaye, 165 Broadway, New York, N. Y.

Lippincott & Smith, 24 California Street, San Francisco 11, California.

Dr. Charles Willard Geer, University of Southern California, Los Angeles, California.

George S. Elpern, Esq., 1017 Woodward Building, Washington, D. C.

Henry B. Weaver, Esq., Tower Building, Washington, D. C.

[fols. 435-436] Roberts & McInnis, Mayflower Office Building, Washington, D. C.

Mr. C. P. Cushway, Webster-Chicago Corporation, 5610 West Bloomingdale Street, Chicago, Illinois.

R. Harvey Levinson, Esq., 33 North La Salle Street, Chicago, Illinois.

Arnold, Fortas & Porter, 1200—18th Street, N. W., Washington, D. C.

(S) Anne Dubivsky

Subscribed and sworn to before me this 28th day of September, 1950, (S) Marjorie E. Vetter, Notary Public, State of New York, No. 31-9462200, Qualified in New York County, Cert. filed with New York Reg. Offices, Term expires March 30, 1952.

[fol. 437] Exhibit "E" to Complaint

Before the Federal Communications Commission

Washington, D. C.

In the Matters of

Docket Nos. 8736 and 8975

Amendment of Section 3.606 of the Commission's Rules and Regulations.

Docket No. 9175

Amendment of the Commission's Rules, Regulations and Engineering Standards Concerning the Television Broadcast Service.

Docket No. 8976

Utilization of Frequencies in the Band 470 to 890 Mcs. for Television Broadcasting.

Petition of RCA

RCA petitions the Commission:

(a) during the period December 5, 1950 to January 5, 1951, to review the improvements made in the performance of the RCA system; and

(b) during the period to June 30, 1951, to view experimental broadcasts of color signals under the RCA, CBS, CTI and other systems, before making a final determination in respect of color standards.

In its Second Notice of Further Proposed Rule Making, released September 1, the Commission requested that by [fol. 438] September 29 all manufacturers of television receivers submit comments in respect of "bracket standards".

We have reviewed the comments filed in accordance with such request. It seems clear from these that it is not practical to manufacture bracket standard receivers within the time prescribed by the Commission.

Since the majority of the Commission felt the most desirable course was to allow more time for the development of all color systems, subject only to a condition which has now been shown to be impractical, we submit the Commission should now allow that time.

We suggest that both the December 5 to January 5 period, referred to by the majority, and the June 30 date, referred to by Commissioner Hennock, be adopted.

During the period December 5 to January 5 we will show the Commission the improvements made in the performance of the RCA system, with particular reference to those points about which the Commission expressed doubts. Some of those improvements are set forth in the RCA Progress Report of July 31, 1950.

By June 30 we will show that the laboratory apparatus which RCA has heretofore demonstrated has been brought to fruition in a commercial, fully-compatible, all-electronic, high-definition system of color television available for immediate adoption of final standards.

Respectfully submitted, Radio Corporation of America, C. B. Jolliffe, Executive Vice President, in Charge of RCA Laboratories Division.

October 4, 1950.

[fol. 439] EXHIBIT "F" TO COMPLAINT

55702
FCC 50-1227

Federal Communications Commission

Washington, D. C.

In the Matters of

Docket Nos. 8736 and 8975

Amendment of Section 3.606 of the Commission's Rules and Regulations

Docket No. 9175

Amendment of the Commission's Rules, Regulations and Engineering Standards Concerning the Television Broadcast Service.

Docket No. 8976

Utilization of Frequencies in the Band 470 to 890 Mcs. for Television Broadcasting

Order

At a session of the Federal Communications Commission held at its offices in Washington, D. C., on the 10th day of October, 1950;

The Commission having under consideration a petition filed on October 4, 1950, by Radio Corporation of America (RCA), requesting (1) that during the period December 5, 1950 to January 5, 1951, the Commission review the improvements made in the performance of the RCA system, and (2) that during the period to June 30, 1951, the Com-[fol. 440] mission view experimental broadcasts of color signals under the RCA, CBS, CTI and other systems before making a final determination with respect to color standards; and

It appearing that the hearing herein on the issues relating to the adoption of rules, regulations and standards for color television was conducted by the Commission during the period commencing September 26, 1949, and ending May 26, 1950; that said hearing consumed 62 days of testimony totalling 9,717 transcript pages; that the Commission heard the testimony of 53 witnesses and received in evi-

dence 265 exhibits; that demonstrations of proposed color television systems were viewed by the Commission on 8 separate occasions; that included among said demonstrations were those conducted by RCA at the Wardman Park Hotel in Washington, D. C., on October 10, 1949, at Temporary "E" Building in Washington, D. C., on November 21 and 22, 1949, at the Commission's Laboratories near Laurel, Maryland on February 23, 1950, and at the Trans-Lux Building in Washington, D. C., on April 6, 1950; and that the Commission studied and considered comprehensive and detailed proposed findings and conclusions and replies thereto filed between the date of closing of the above record and July 10, 1950; and

It further appearing that on September 1, 1950, the Commission issued its "First Report of Commission (Color Television Issues)" (FCC 50-1064), setting forth its findings and conclusions with respect to the color television issues herein and specifying the contingencies, terms and conditions under which it would give consideration to new proposed color television systems, and under which it might consider reopening the above hearing record; and [fol. 441] It further appearing that petitioner has had a full and fair opportunity to present its proposals to the Commission; that the state of the television art is such that new ideas and new inventions are matters of weekly, even daily occurrence; that the question of approving a color television system which will best serve the interests of the American people is one which has been before the Commission for almost 10 years; that in all proceedings such as the instant one a point is reached which calls for administrative finality with respect to the Commission's hearing processes; and that in the sound discretion of the Commission a delay in reaching a determination with respect to the adoption of standards for color television service as requested in the instant petition would not be conducive to the orderly and expeditious dispatch of the Commission's business and would not best serve the ends of justice; and

It further appearing that simultaneously with the issuance of this Order the Commission is issuing its "Second Report of the Commission" (FCC 50-1224) and its "Order" amending its "Standards of Good Engineering Practice Concerning Television Broadcast Stations" (FCC 50-1225); and

It further appearing that the Commisison, in said "Second Report" stated:

> "It is, therefore, contemplated that interested persons may conduct experimentation in accordance with experimental rules not only as to color television but as to all phases of television broadcasting. Of course, any person conducting such experimentation should realize that any new color system that is developed for utilization on regular television channels must meet [fol. 442] the minimum criteria for a color television system set forth in our First Report. In addition, any such system that is developed or any improvement that results from the experimentation might face the problem of being incompatible with the present monochrome system or the color system we are adopting today. In that event, the new color system or other improvement will have to sustain the burden of showing that the improvement which results in substantial enough to be worth while when compared to the amount of dislocation involved to receivers then in the hands of the public."

It is ordered that the petition herein is denied.

Federal Communications Commission.* T. J. Slowie, Secretary.

Released: October 11, 1950.

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* Commissioners Sterling and Hennock concur in the result.

[fol. 443] EXHIBIT "G" TO COMPLAINT

55725
FCC 50-1224

Federal Communications Commission

Washington 25, D. C.

In the Matters of

Docket Nos. 8736 and 8975

Amendment of Section 3.606 of the Commission's Rules and Regulations

Docket No. 9175

Amendment of the Commission's Rules, Regulations and Engineering Standards Concerning the Television Broadcast Service

Docket No. 8976

Utilization of Frequencies in the Band 470 to 890 Mcs. for Television Broadcasting

Second Report of the Commission

1. On September 1, 1950, the Commission issued its First Report in the above-entitled proceedings. This Report contained detailed findings and conclusions concerning the three color systems which were proposed to the Commission on the record in these proceedings. The Report also set forth minimum criteria which a color system must meet in order to be considered eligible for adoption.

2. In brief, the Commission found that the so-called compatible systems proposed by Color Television, Inc. (CTI) [fol. 444] and Radio Corporation of America (RCA) in these proceedings fall short of the minimum criteria we have established for a color television system. As to the CTI system, the Commission found it deficient in the following respects:

(a) The quality of the color picture is not satisfactory.

(b) There is serious degradation in quality of the black and white pictures which existing receivers get from CTI color transmissions.

(c) The equipment utilized by the CTI system both at the receiver and station end is unduly complex.

(d) Insufficient evidence was offered as to whether the system is not unduly susceptible to interference.

3. The Commission found the RCA system deficient in the following respects:

(a) The color fidelity of the RCA picture is not satisfactory.

(b) The texture of the color picture is not satisfactory.

(c) The receiving equipment utilized by the RCA system is exceedingly complex.

(d) The equipment utilized at the station is exceedingly complex.

(e) The RCA color system is much more susceptible to certain kinds of interference than the present monochrome system or the CBS system.

(f) There is not adequate assurance in the record that RCA color pictures can be transmitted over the 2.7 megacycle coaxial cable facilities.

[fol. 445] (g) The RCA system has not met the requirements of successful field testing.

4. The Commission pointed out in its Report that if a satisfactory compatible color system were available, it would certainly be desirable to adopt such a system. However, the Commission was forced to conclude from the evidence in the record that no satisfactory compatible system was demonstrated in these proceedings and the Commission stated that in its opinion, based upon a study of the history of color development over the past ten years, from a technical point of view, compatibility, as represented by all compatible color systems which have been demonstrated to date, is too high a price to put on color. In an effort to make these systems compatible, the result has been either an unsatisfactory system from the standpoint of color picture quality, or a complex system, or both.

5. The Report stated that in the Commission's opinion, the CBS system produces a color picture that is most satisfactory from the point of view of texture, color fidelity and contrast. The Commission stated that receivers and station equipment are simple to operate and that receivers

when produced on a mass marketing basis should be within the economic reach of the great mass of purchasing public. The Commission further found that even with present equipment the CBS system can produce color pictures of sufficient brightness without objectionable flicker to be adequate for home use and that the evidence concerning long persistence phosphors shows that there is a specific method available for still further increasing brightness with no objectionable flicker. Finally, the Commission pointed out that while the CBS system has less geometric resolution than the present monochrome system the addition of color to the picture more than outweighs the loss in geometric resolution so far as apparent definition is concerned.

[fol. 446] 6. The Commission did not in its First Report finally adopt the CBS color system. Instead, it set forth a procedure whereby, if the status quo on compatibility were maintained, a decision would be postponed so that the Commission could give further consideration to four matters—large-size direct-view tubes on the CBS system, horizontal interlace, long persistence phosphors, and the development of new compatible systems and improvements in existing compatible systems, which had been informally called to the Commission's attention since the conclusion of the hearing. It is obvious that some procedure had to be devised whereby the compatibility problem would not be aggravated if a decision were postponed. Otherwise, we would be in the position of inviting the risk that if, after postponing a decision, the compatible color systems should again fail to meet the minimum criteria for a color system, as they have failed in the past, the number of receivers in the hands of the public would have increased to such a point where, as a practical matter, it might not be practicable to adopt an incompatible color system even though we now know that such system meets all of the criteria for a color system. Hence, it is obvious that if a decision were to be postponed, a method had to be devised to maintain the status quo on compatibility so that when the time did arrive for making a decision, the Commission would be in relatively the same position as it is today—so far as compatibility is concerned—to adopt a successful incompatible system if all of the compatible systems again failed to meet the minimum criteria for a color system.

7. The Commission's First Report suggested a method whereby the status quo on compatibility could be maintained. This method is the incorporation of brackets into receivers hereafter manufactured which would permit such [fol. 447] receivers to receive black and white pictures from present transmissions, CBS color transmissions and any other transmissions within a range of 15,000 to 32,000 lines per second and 50 to 150 fields per second. Manufacturers were requested to submit their comments by September 29, 1950 as to whether they could and would manufacture their receivers with such brackets commencing with the effective date of the Commission's order adopting the bracket standards as final.

8. The comments have now been received and have been carefully considered by the Commission. The manufacturers who have responded—and these manufacturers represent the greatest part of the manufacturing capacity of the television industry—have indicated that they are unable or unwilling to meet the requirements as to brackets set forth in the Commission's First Report and in its Notice concerning brackets. Nor have these manufacturers suggested any other method whereby the status quo as to compatibility can be maintained if a decision is postponed at the present time. Accordingly, we would be derelict in our responsibility to the public if we postponed a decision any longer. With no way of preventing the growth of incompatibility, the longer we wait before arriving at a final decision the greater the number of receivers in the hands of the public that will have to be adapted or converted if at a later date the CBS color system is adopted. Simultaneously with the release of this Report we are issuing an Order adopting standards for color television on the field sequential system. In view of the nature of the comments as to bracket standards, we are not able to adopt them without a hearing. Such a hearing will be scheduled at a later date.

[fol. 448] 9. In arriving at this conclusion we have carefully considered all the material set forth in the comments, filed pursuant to our notice concerning bracket standards, as they are directed to the findings and conclusions in the Commission's First Report relating to the three color systems. Most of this material is merely a restatement of the parties' contentions made over and over again during the

course of the hearing. These contentions have been analyzed in detail in the Report and no further discussion of them is necessary here.

10. There are, however, two contentions raised in the comments which merit a brief discussion. The first contention refers to the statement in paragraph 125 of the First Report that there is some doubt as to whether some of the color systems proposed in these proceedings meet the test of adaptability and convertibility set forth in the Commission's Notice of July 11, 1949. The argument is made that this statement refers to the CBS system and hence that it is not eligible for consideration. This contention is a distortion of the Commission's Report. It is clear from a reading of the Commission's Report that the CBS system squarely meets the test of adaptability and convertibility set forth in the Notice of July 11, 1949. It is the CTI and RCA systems that fail to meet the test, for neither CTI nor RCA demonstrated a practical converter and hence failed to meet the test of convertibility. However, the Commission did not rule out the CTI or RCA systems on this ground but instead considered both systems on the merits.

11. The second contention is that the Commission cannot on this record issue a final order at the present time but is limited to the issuance of proposed rules only. This [fol. 449] contention has no basis in fact. The Commission's Notice of July 11, 1949, proposed that the present transmission standards be utilized on Channels 2 through 55. Interested persons were explicitly invited to submit proposals for a change in transmission standards on these channels looking towards color television. These proposals were required to be specific as to any change or changes in the transmission standards proposed and had to meet certain requirements. Pursuant to this Notice, CTI, CBS and RCA submitted specific color proposals. Evidence in support of and in opposition to these specific proposals was offered during the hearing. The standards which are being adopted by the Commission are the result of expert calculations based upon the characteristics of the present standards and the evidence concerning the CBS field sequential color system. It is clearly within the province of the rule-making proceedings as prescribed by the Adminis-

trative Procedure Act to adopt such standards without the necessity for further proceedings.

12. In arriving at our conclusions in this Record, we have not overlooked the matters set forth in paragraph 6 of this Report as to which we indicated we would give further consideration if a decision were postponed. The first such matter is the problem of large-size direct-view tubes in the CBS system. As we pointed out in our First Report, at the present time the CBS system is, as a practical matter, limited to direct-view tubes no larger than 12½ inches in size. However, we are willing to adopt the CBS system on the basis of the evidence in the record which satisfied us that CBS can produce satisfactory color pictures on projection receivers and on direct-view tubes of at least 12½ inches in size. The argument is made that the trend in purchasing has been to larger size direct-view [fol. 450] receivers and hence the public will not buy projection receivers or direct-view receivers with a 12½ inch tube. This may be true when all sets receive black and white pictures only. However, the Commission believes that the attractiveness of color pictures may be sufficiently great to cause people to prefer a direct-view receiver with a 12½ inch tube or a larger size projection receiver if they can get color as against a 16 inch, 19 inch or larger direct-view receiver that is limited to black and white pictures. In any event, if both types of receivers are offered to the public, it will be the free forces of competition which govern whether a customer will buy a color receiver or a black and white receiver. Moreover, the adoption of the CBS color system will furnish a healthy incentive to all manufacturers to develop larger size direct-view color pictures. Efforts already expended in the development of a successful tri-color direct-view tube that has no limitation on size will be intensified, for a substantial competitive advantage would accrue to the company able to produce such tubes. All of the expert witnesses agreed that a direct-view tri-color tube if successfully developed could be utilized on the CBS color system.

13. The second matter we referred to in paragraph 6 of this report is horizontal interlace. The record is clear that if this technique is successfully developed for the CBS system, it can be added at a later date without affect-

ing receivers in the hands of the public. The addition of horizontal interlace will increase horizontal resolution on receivers with appropriate circuits. Receivers without such circuits would not receive the benefit of this additional resolution but they would continue to receive the same performance as to resolution that they enjoyed before the addition of horizontal interlace. If it had been possi- [fol. 451] ble to adopt bracket standards now, the Commission could at the time of adopting horizontal interlace (if it is determined that it should be adopted) determine whether to increase vertical resolution as well as horizontal resolution. Receivers with brackets could accommodate themselves to the new line rate. Since receivers without brackets could not be adjusted to a different line rate, our inability to adopt brackets at this time probably means that as a practical matter, when and if horizontal interlace is adopted for the color system, the improvement may be confined to horizontal resolution.

14. The third matter we referred to in paragraph 6 of this Report is utilization of receiver tubes with long persistence phosphors. The benefit which can be expected from long persistence phosphors is much brighter pictures with no objectionable flicker. Had it been possible to adopt brackets now, then if developments in the field of long persistence phosphors turned out to be sufficiently impressive, the Commission could consider lowering the field rate and increasing resolution without objectionable flicker. Since we are not able at this time to adopt bracket standards, improvements from long persistence phosphors might, as a practical matter, be limited to increasing brightness without objectionable flicker.

15. The fourth matter we referred to in paragraph 6 of this Report is the possibility of new compatible color systems and improvements in existing color systems which have been informally called to our attention since the hearings closed. In the Commission's opinion a new television system is not entitled to a hearing or a reopening of a hearing simply on the basis of a paper presentation. In the radio field many theoretical systems exist and can be described on paper but it is a long step from this process [fol. 452] to successful operation. There can be no assurance that a system is going to work until the apparatus has been built and has been tested. None of the new systems or

improvements in systems meet these tests so as to warrant reopening of the hearing. To do so would be inviting the risk that these new systems might fail as have all color systems in the past which we have been urged to adopt on the grounds of compatibility and the increase in number of receivers in the hands of the public would make it exceedingly difficult to adopt an incompatible system—a system which we know is satisfactory.

16. The Commission does not imply that there is no further room for experimentation. Radio in general and television in particular are so new that extensive experimentation is necessary if the maximum potentialities of radio and television are to be realized. Many of the results of such experimentation can undoubtedly be added without affecting existing receivers. As to others some obsolescence of existing receivers may be involved if the changes are adopted. In the interest of stability this latter type of change will not be adopted unless the improvement is substantial in nature, when compared to the amount of dislocation involved. But when such an improvement does come along, the Commission cannot refuse to consider it merely because the owners of existing receivers might be compelled to spend additional money to continue receiving programs.

17. It is, therefore, contemplated that interested persons may conduct experimentation in accordance with experimental rules not only as to color television but as to all phases of television broadcasting. Of course, any person conducting such experimentation should realize that any new color system that is developed for utilization on regu- [fol. 453] lar television channels must meet the minimum criteria for a color television system set forth in our First Report. In addition, any such system that is developed or any improvement that results from the experimentation might face the problem of being incompatible with the present monochrome system or the color system we are adopting today. In that event, the new color system or other improvement will have to sustain the burden of showing that the improvement which results is substantial enough to be worth while when compared to the amount of dislocation involved to receivers then in the hands of the public.

18. For the reasons set forth in our First Report and in this Report, we find that the public interest will be served

by adopting the field sequential color television system. An appropriate order is accordingly being issued simultaneously with this Report.

Federal Communications Commission,* T. J. Slowie, Secretary.

Adopted: October 10, 1950
Released: October 11, 1950

[fol. 454] Dissenting Opinion of Commissioner Geo. E. Sterling

In the First Report of the Commission on the Color Television issues, I joined with the majority in the proposal for bracket standards with the understanding that if an insufficient number of assurances were received from manufacturers concerning their plans for incorporating bracket standards in their receivers, the Commission would issue a final decision adopting the CBS color standards.

Since the responses were not in accordance with the Commission's proposal, the majority have adopted the CBS color standards. I dissent from this premature action taken by the majority at this time for the following reasons.

The subject of bracket standards was not at issue in the hearing nor was the subject even advanced during the hearing. There is no doubt in my mind that manufacturers were taken by surprise at the Commission's approval on this subject as set forth in the First Report.

I do not agree with the majority in their Second Report that the responses of the manufacturers were merely a restatement of the parties' contentions made during the hearing, since the subject of bracket standards was a new concept in field and line scanning proposed after the hearing record closed. It came as a surprise to industry and was not based upon information appearing in the record of this proceeding.

Several manufacturers were confused by the Report as it related to bracket standards and representatives of different manufacturers communicated and met with the staff at various times for the purpose of securing an interpre-[fol. 455] tation of the Commission's intent. The exchange of correspondence with the Philco Corporation subse-

* Commissioners Sterling and Hennock Dissenting.

quently made public is a classic example of the confusion aroused in the minds of manufacturers who evidenced a sincere interest in the problem.

The Columbia Broadcasting System found it necessary in this respect to voice its concern as to the interpretations that might be made of paragraph 5(c) and therefore consulted with the staff for clarification of the language. CBS also suggested that the Commission make clear by public statement what was intended by the language of paragraph 5(c).

Because bracket standards were new, I am now of the opinion that the Commission should have treated the subject at greater length in its First Report. Because of the time lost in seeking clarification of the Commission's intent and the necessity of meeting the September 29th deadline, manufacturers were unable to make a full appraisal of how they could build in bracket standards and when.

The response of Capehart-Farnsworth Corporation, I think, truly poses the problem confronted by manufacturers who are desirous of cooperating with the Commission, since it encompasses not only design and production of TV receivers embodying bracket standards capable of meeting the Commission's requirements as to geometric linearity and brightness but also points up the necessity of procuring signal generating equipment for the purpose of testing receivers incorporating bracket standards.

The Capehart-Farnsworth Corporation's response stated, in part, as follows:

> "We are having some difficulty in obtaining pictures of geometric linearity and brightness on the [fol. 456] higher frequencies and, in particular, we are faced with problems such as return time of the horizontal sweep and consequent reduced scanning efficiency. Other problems involve the loss of high voltage due to high frequencies with the deflection components now used and it is evident that new components, such as the deflection yoke and transformer, will have to be designed in order to meet the requirements stated in paragraph 151 of the Commission's Report 50-1064.
>
> "Also, until adequate signal generating equipment becomes available and until such times as the composite signal standards have been set, with particular reference to horizontal and vertical blanking time, we would

be unable to produce a product design which would assure satisfactory operation for both the monochrome and color television transmissions."

The serious problems that confronted the Belmont Corporation, who also expressed a desire to cooperate, are stated, in part, as follows:

"We have been unable to find any record in technical literature nor in our past experience of an attempt to produce a linear sweep for electro-magnetic deflection systems covering the wide range of the proposed bracket requirement and at the same time adhering to the proposed requirements of constant picture size and brightness. Moreover, the major effort of our engineering department since the publication of Notice 50-1065 has failed to indicate any method of accomplishing the bracket standards. The standards called for by the notice create a far different problem from [fol. 457] that of incorporating in television receivers dual sweep systems permitting switching between specific standards, a system which probably could be engineered in the present state of the art.

"While Belmont has every desire to cooperate with the Commission in developing bracket standards, which are feasible from both the cost and engineering standpoints, it is clear from the above and from the results of our engineering survey that this cannot be accomplished within the time contemplated in the Commission's time schedule. Before Belmont could begin to manufacture television receivers with such standards, a method feasible from the engineering standpoint would have to be developed, the new equipment designed and field tested, a re-tooling operation accomplished, additional materials obtained and production methods revised. Hence, it would not be possible to be in production of receivers incorporating such bracket standards for a very much lonegr period than that contemplated by the Commission's time schedule."

The problems of industry in terms of time are also succintly set forth in the response of Motorola, Inc., in which they stated:

"Motorola's approach to this entire matter is in the spirit of cooperation, accomplishment and realism.

Therefore, I hope that you seriously weigh what we set forth herein when you come to a decision on this subject.

"We are thoroughly convinced that the time allotted for a manufacturer to incorporate bracket standards into his production is inadequate. To further acquaint [fol. 458] you with Motorola's situation in this matter of time and to further demonstrate the inadequacy of the proposed time cycle, we are attaching herewith a report from our Engineering Division. This report is supported with two chronological histories taken at random from our Engineering Log Books. These histories set forth the mile posts of time for two engineering projects, that we classify as minor modification. The engineering principles involved in these two cases were generally known before the inauguration of the projects. Many of the technical principles involved in the integration of bracket standards require engineering development to reduce them to commercial practice. Therefore, we would like to make clear that the integration of bracket standards into our manufacturing is not a minor modification. In fact, bracket standards covering the full range require a complete chassis redesign."

The Hallicrafters Co. in their response to the Commission stated they had made every effort to determine their ability to cooperate with proposals of the Commission and significantly pointed out:

"The design of a receiver which will operate on any combination of field or line scanning frequencies within the proposed brackets is something we do not know how to accomplish in the present state of the art. This design would follow considerable basic research for which we cannot estimate a completion date. Following the date of engineering release, a materials procurement cycle of two to four months must pass before actual manufacture can begin. These time factors coupled with whatever date the Commission might [fol. 459] choose to release an order establishing Bracket Standards will determine whether we can supply Bracket Standards receivers within 30 days of the Order."

Several manufacturers stress the need for field testing after receivers have been made by their engineering departments. In its Report the Commission stressed the need of adequate field testing. In its First Report rejecting the RCA system, the Commission placed emphasis on the fact that this system had not been field tested and made mention that the system introduces entirely new techniques into broadcasting. So do bracket standards and yet the Commission in its failure to consider a reasonable timetable deprives manufacturers of the opportunity to field test this new device and, therefore, has taken an inconsistent stand with its enunciation of the importance of this element in the evolution of a new system. Manufacturers have a responsibility to the purchasing public and one of the important criteria of meeting this responsibility is through field testing its products prior to introducing them to the public. The competitive forces in this industry are tremendous and as in all products designed for public acceptance a manufacturer rises or falls according to the merits of his product. In my opinion, part of a reasonable timetable should include the necessity of field testing bracket standards under varying conditions of reception, including temperature, humidity, signal strength, etc.

Neither the Commission nor its staff has the necessary experience in the design and manufacture of TV receivers. Consequently, the Commission must take the word of reliable manufacturers who were willing to cooperate but unable to meet the Commission's short timetable. In its First [fol. 460] Report the Commission stated "that (it) is aware that of necessity it must rely to a great extent upon industry experts for data and expert opinion in arriving at decisions in the field of standards, our own facilities are too limited to gather much of the data"—paraphrasing this statement as it concerns bracket standards the Commission should say that it must take the word of industry as it concerns the design and production of bracket standards since it does not have the "know-how". By providing for a reasonable timetable the Commission would have in the end the experience of industry in this new concept of field and line scanning and would be able to better judge what it would cost the public and if it would provide the avenues for improvement that might be made in the art.

The problems confronting manufacturers today in terms of production, procurement and manpower to meet the de-

mands of national defense are serious ones. Surely the responses of such reliable manufacturers must be given credence and consideration. It is well known that there are serious shortages of tubes and resistors as well as basic materials. The situation on procurement is so acute that manufacturers have been shipping their TV receivers without a full complement of tubes, trusting to their dealers to procure them in local markets but the local market supply has been exhausted as the result of not only the local demands but as the result of the purchasing agents and manufacturers' representatives combing every territory in their search for components in short supply. At least one company has agents in Europe attempting to purchase resistors. This condition aggravated by others is bound to have a serious effect on production and will serve only to delay the availability of parts to make not only bracket standards but also parts with which to build adapters, converters and color receivers. Moreover, in many instances [fol. 461] industry has been required to divert its TV engineering experts to problems of production for defense because of the close relation of TV techniques to radar and other electronic devises the Government requires.

After a thorough study of the responses and taking into consideration the current problems of industry, I am convinced that the Commission's timetable presented to industry in its First Report to build in bracket standards was unreasonable. I think much could be accomplished in the interest of all concerned if we called a two-day conference with those members of the industry who indicated a willingness to cooperate with the Commission for the purpose of exploring the problem of bracket standards looking to a realistic timetable that could be met by industry without unduly aggravating the compatibility problem.

In the period that has passed since the manufacturers submitted their replies to meet the September 29th date line, I feel certain that they have continued their study of the problem and would be in a position at the end of a two-day conference with the Commission and staff to agree on a reasonable timetable similar to that proposed by the Commission in its First Report had manufacturers met the requirements of the Commission's proposal. Surely, this would be more timely than after a hearing at some subsequent date and the Commission then decided

to adopt bracket standards. If such a conference did not result in a practical solution of the problems I have discussed, I would then join the majority in authorizing the field sequential system.

If as the result of a hearing at some later date, bracket standards are adopted by the Commission, manufacturers [fol. 462] will be faced with the problem of redesigning and re-tooling in order to build such circuitry in receivers. Such a course of action on the part of the Commission will serve to slow up production and place hardship on manufacturers and will compound the confusion in the public mind, particularly those of the public that purchase a color receiver having dual standards since they will then possess receivers which will be unable to utilize the improvements made possible by the adoption of bracket standards. In the event that such improvements result in a change in scanning rates which fall outside the scope of the dual standards here adopted, those sets will be incompatible.

The Commission proposed a way to keep the door open for demonstrations of new systems, improvements of existing systems that came to light after the hearing record had closed, and demonstrations of the CBS system on large-size tri-color tubes of two or three manufacturers. Because the Commission would not take time to discuss with representatives of the industry who indicated a willingness to cooperate, the door has been closed.

In its First Report the Commission stated:

> "Since there was no demonstration on the record of a direct view tri-color tube on the CBS system, the record does not contain a definitive answer as to whether direct view tubes larger that 12½ inches are possible with the CBS system. Thus two difficult courses of action are open to the Commission. The first course of action is to reopen the record and to have a demonstration on the record wherein a tri-color tube or other technique for displaying large size direct-view pictures could be tried out on the CBS system."

[fol. 463] The record indicates that present color phosphors such as are used with tri-color tubes would not yield the same fidelity that is possible from filters as employed with the CBS disc receivers. By providing a reasonable timetable without seriously aggravating the compatibility

problem such a demonstration could have been made on the record and the question resolved once and for all.

By closing the door at this time the Commission also passed up the opportunity to provide a means of increasing the resolution of color pictures by lowering the field rate without objectionable flicker through the use of long persistence phosphors.

As a result of the Commission's action in immediately adopting CBS standards, proponents of new or improved systems must now look to an experimental license to do their testing and demonstrating. The Commission has stated in its Second Report a new color system or other improvements will have to sustain the burden of showing that improvements which result are substantial enough to be worthwhile when compared to the amount of dislocation involved to receivers then in the hands of the public. Therefore, we see that the public and industry at some later date again may be faced with the problem of compatibility.

The door also has been closed on the opportunity of taking one more look at compatible systems before moving to adopt an incompatible system with all its attendant problems as they relate to the 10 million receivers that will be in the hands of the public by the end of the year as well as the manufacturers' problem of production.

I joined with the majority in the First Report with regard to what was said about the problems that seemed to confront a compatible color system and with the conclusion that no satisfactory compatible color system had [fol. 464] been developed at the time the record closed.

New developments came fast in the closing days of the hearing and immediately thereafter.

It was pointed out in the First Report that the Commission is aware that the institution of the color proceedings stimulated great activity in color developments and that fundamental research cannot be performed on schedule, and that it is possible that much of the fruit of this research has begun to emerge. This is confirmed by the facts, which include the announcement of two new compatible systems and by the RCA Progress Report of July 31, 1950, that the number of dots in the RCA tri-color tubes has been increased from 351,000 to 600,000 with the attendant increase in resolution. Other improvements were also made in the RCA system after the record was closed.

I am convinced that it would have been prudent to have taken time out to view these recent developments before moving finally to adopt an incompatible system.

I find it necessary also to dissent from the belief expressed by the Commission in the Second Report and which was not in the First Report in which I joined with the majority. In paragraph 12 in the Second Report, the Commission states:

> "The Commission believes that the attractiveness of color pictures may be sufficiently great to cause people to prefer a direct-view receiver with a 12½ inch tube or a larger size projection receiver if they can get color as against a 16 inch, 19 inch or larger direct-view receiver that is limited to black and white pictures. * * *"

[fol. 465] I do not agree with this belief. I believe that the rapid acceptance by the public of receivers incorporating larger sized black and white tubes as they moved from 7" to 10" to 12", then to 16" and 19" clearly indicates the preference of the public for large size TV pictures and they will not be satisfied with smaller pictures because they are in color. Due to the fact that color adds so much to television both from the program as well as the advertising standpoint, both the public and the sponsor will demand large size color tubes.

Dissenting Views of Commissioner Hennock

As I indicated in my separate views to the Commission's First Report on Color, I am of the firm belief that every possible effort should be made by this Commission and the television manufacturing industry to achieve a practical and useful compatible color television system. Considering the fact that there are currently well over 7,000,000 receivers in the hands of the public which can receive, in their present form, only signals broadcast on present monochrome standards, many grave problems will be posed by the adoption of the incompatible field sequential color television system. The owners of these sets must eventually suffer a diminution in television service or they will be forced to make some expenditure to adapt or convert their sets for the reception of color signals. The cost of such changes and the servicing difficulties which they will entail

pose a problem of great magnitude, and the end result in the case of adaption will be a monochrome picture of reduced resolution. The broadcaster will find that, to the extent that he employs color transmissions, he will lose part of his audience, and this will create a long and difficult period of transition.

[fol. 466] I agree with the Commission's evaluation of the color systems which have been proposed and demonstrated in the instant proceedings. I felt at the time of the First Report, and still feel, that, in the light of this evaluation, it is eminently desirable that the problem posed by the number of television receivers in the hands of the public as regards the incompatible field sequential color system be arrested at its present level. I believed that the concept of "bracket standards" set forth in the First Report was a practical method for achieving this end, and I therefore joined in that portion of the First Report.

The comments filed in response to our Second Notice of Further Proposed Rule Making indicate quite clearly that the bracket standards proposal is not a feasible method for containing the problem of incompatibility at its present level. Most of the comments did not indicate whether other means for achieving this aim are available, although a few did discuss possible alternative methods.

But in the light of the progress made in the development of color television since the start of the instant proceeding, I think it essential to defer final decision in this matter until June 30, 1951. This could still be done if some means for preventing the growth of incompatibility could be devised by the television manufacturing industry. The fact that bracket standards could not achieve this result does not automatically preclude its attainment. Possibly some modified version of bracket standards could be incorporated into television receivers without raising the major problems of re-design and equipment procurement involved by bracket standards. Or it might be feasible to provide adaptation—either internal or external—with each receiver. The manufacturing industry is familiar with this process since it has been for a considerable time a part of the record in this proceeding. The ingenuity [fols. 467-468] of the industry's electronic scientists might be able to devise some other means of arresting the problem of compatibility and thereby provide further time for the

development of a practical compatible color television system.

I feel that the Commission should explore fully with the industry any and all possibilities. This could be done either by means of an industry conference or by a Notice of Further Proposed Rule Making requesting comments. It is of vital importance to the future of television that we make every effort to gain the time necessary for further experimentation leading to the perfection of a compatible color television system. If as a result of such a conference or comments filed by the industry, it appears that steps can be taken within 60 or 90 days to arrest the growth of incompatibility, the final decision in this proceeding authorizing the field sequential system should be deferred until June 30, 1951. If not, those standards should be immediately adopted.

I think it important to repeat the conviction expressed in my separate views to the First Report that there is a moral obligation on this Commission to insure that a reasonable amount of valuable programming service will continue to be rendered to present set owners, both day and night, for a transitional period, e.g., three to five years, without the necessity for making any expenditure to change their sets.

[fol. 469] EXHIBIT H TO COMPLAINT

55655
FCC 50-1225

Federal Communications Commission
Washington 25, D. C.

In the Matters of

Docket Nos. 8736 and 8975

Amendment of Section 3.606 of the Commission's Rules and Regulations

Docket No. 9175

Amendment of the Commission's Rules, Regulations and Engineering Standards Concerning the Television Broadcast Service

Docket No. 8976

Utilization of Frequencies in the Band 470 to 890 Mcs. for Television Broadcasting

Order

At a session of the Federal Communications Commission held at its offices in Washington, D. C., on October 10, 1950;

The Commission having under consideration the promulgation of engineering standards for color television; and

It appearing that on September 1, 1950 the Commission issued (1) Findings and Conclusions in the above proceedings entitled "First Report of Commission (Color Television Issues)" (FCC 50-1064), and (2) its "Second Notice [fol. 470] of Further Proposed Rule Making" (FCC 50-1065); and

It further appearing that simultaneously with the issuance of this Order the Commission is issuing its "Second Report of the Commission" (FCC 50-1224);

Accordingly, on the basis of the findings and conclusions set forth in both of the above Reports,

It is ordered, that effective the 20th day of November, 1950, the Commission's "Standards of Good Engineering

Practice Concerning Television Broadcast Stations" are amended in the following respects:

(1) Paragraphs "5", "6", "7", and "8" of Section I B entitled "Visual Transmitter" are revised to read as follows:

5. Color transmission.—The term "color transmission" means the transmission of color television signals which can be reproduced with different values of hue, saturation, and luminance.

6. Field—The term "field" means scanning through the picture area once in the chosen scanning pattern and in a single color. In the line interlaced scanning pattern of two to one, it means the scanning of the alternate lines of the picture area once in a single color.

7. Frame.—The term "frame" means scanning all of the picture area once in a single color. In the line interlaced scanning pattern of two to one a frame consists of two fields.

[fol. 471] 8(a). Color field.—The term "color field" means scanning through the picture area once in the chosen scanning pattern and in each of the primary colors. In the line interlaced scanning pattern of two to one, it means the scanning of the alternate lines of the picture area once in each of the primary colors.

(b) Color frame.—The term "color frame" means scanning all of the picture area once in each of the primary colors. In the line interlaced scanning pattern of two to one, a color frame consists of two color fields.

(2) Paragraphs "5", "6" and "13" of Section 2 A entitled "Transmission Standards and Changes or Modifications Thereof" are revised to read as follows:

5. For monochrome transmission the number of scanning lines per frame shall be 525, interlaced two to one in successive fields. The frame frequency shall be 30, the field frequency 60, and the line frequency 15,750 per second.

6. For color transmissions the number of scanning lines per frame shall be 405, interlaced two to one in successive fields of the same color. The frame frequency shall be 72, the field frequency 144, the color

frame frequency 24, the color field frequency 48, and the line frequency 29,160 per second.

13. The level at maximum luminance shall be 15% or less of the peak carrier level.

[fol. 472] (3) The following new paragraphs "19" and "20" are added to Section 2 A:

19. The color sequence for color transmission shall be repeated in the order red, blue, green in successive fields.

20. The transmitted color characteristics for color transmission shall be such as to reproduce the transmitted colors as correctly as the state of the art will permit on a receiver having the following trichromatic co-efficients, based on the standardized color triangle of the International Commission on Illumination:

Red	*Blue*	*Green*
x = .674	x = .122	x = .227
y = .326	y = .142	y = .694

(4) New "Appendix I" attached hereto entitled "Television Synchronizing Waveform" is substituted for "Appendix I" of the "Standards of Good Engineering Practice Concerning Television Broadcast Stations".

Federal Communications Commission*, T. J. Slowie, Secretary.

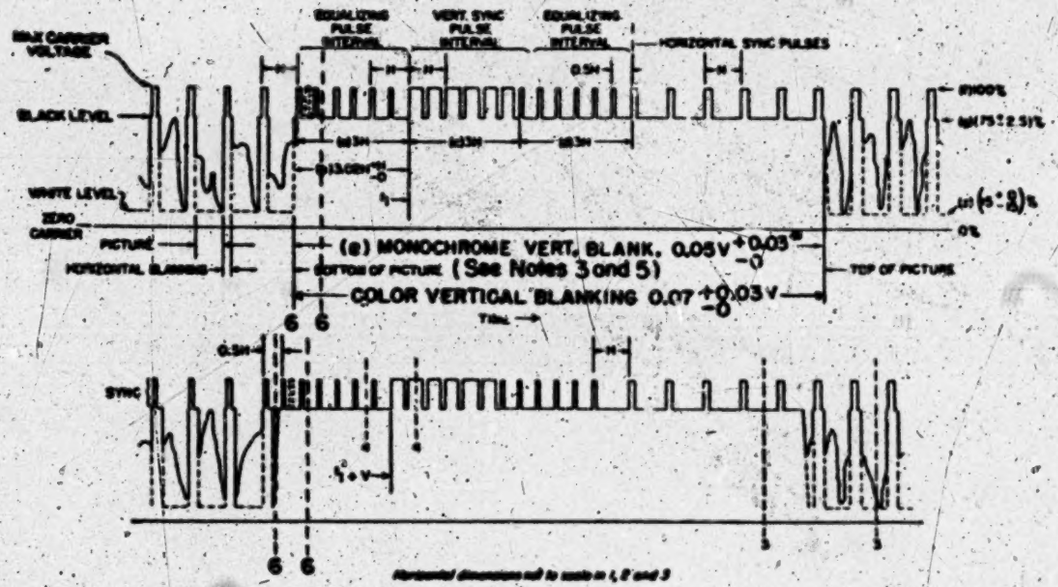
Released: October 11, 1950.

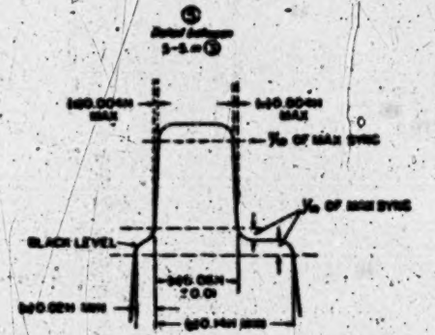
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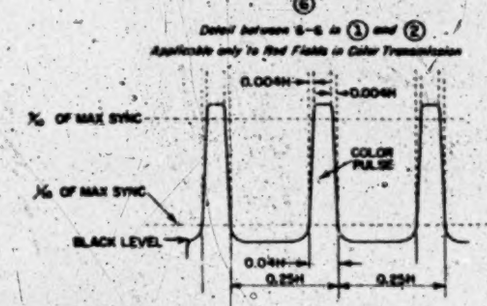
* Commissioners Sterling and Hennock dissenting.

Here follows 1 Photolithograph side folios 473-474.

TELEVISION SYNCHRONIZING WAVEFORM







NOTE

1. H = Time from start of one line to start of next line
2. V = Time from start of one field to start of next field
3. Leading and trailing edges of vertical blanking should be complete in less than 0.1H
4. Leading and trailing slopes of horizontal blanking must be steep enough to preserve maximum and minimum values of (vy) and (i) under all conditions of picture content
5. Dimensions marked with asterisk indicate that tolerances given are permitted only for long time variations and not for successive cycles
6. Equalizing pulse area shall be between 0.45 and 0.5 of area of a horizontal sync pulse
7. Color pulse area shall be between 0.45 and 0.5 of the area of a horizontal sync pulse
8. Refer to text for further explanations and tolerances

APPENDIX I

F.C.C. - WASHINGTON, D. C.

[fol. 475] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

NOTICE—Filed October 24, 1950

To: Attorney General of the United States, Washington, D. C., United States Attorney for the Northern District of Illinois, United States Court House, Chicago, Illinois, Federal Communications Commission, Washington, D. C.

Please take notice that on October 30, 1950, at the opening of Court in the forenoon of said day, or as soon thereafter as counsel can be heard, the undersigned will appear before the Honorable Philip L. Sullivan, Judge of the aforesaid Court, in the courtroom usually occupied by him in the United States Court House, Chicago, Illinois, and shall present to the Court a written motion for a temporary injunction and other relief, copies of which motion are served upon you herewith.

Weymouth Kirkland, Kirkland, Fleming, Green, Martin & Ellis, by Weymouth Kirkland, A Member of the Firm, Attorneys for Plaintiffs, Office and P. O. Address, 33 No. La Salle Street, Chicago, Illinois.

Of Counsel: Cahill, Gordon, Zachry & Reindel, New York City. John T. Cahill, Joseph V. Heffernan, John W. Nields.

[fol. 476] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

MOTION OF PLAINTIFFS FOR TEMPORARY INJUNCTION AND OTHER RELIEF—Filed October 24, 1950

Now come plaintiffs, Radio Corporation of America, National Broadcasting Company, Inc. and RCA Victor Distributing Corporation, and respectfully move:

1. That a temporary or interlocutory injunction be entered herein restraining, enjoining and suspending until further order of this Court the promulgation, operation and execution of the Order of the Federal Communications Commission issued October 10, 1950, effective November 20, 1950, adopting the Columbia Broadcasting System, Inc. (CBS) color television system for commercial broadcasting

of color television (which Order is more fully described in paragraph 1 of the complaint herein), on the grounds set forth in said complaint;

2. That this Court convene a specially constituted court of three judges, as required by Title 28, United States Code, Sections 2284 and 2325, to hear and determine said motion, as well as to hear and determine all other matters in this cause requiring determination by such a specially constituted court in accordance with the law in such cases made and provided;

[fol. 477] 3. That the foregoing motion for a temporary or interlocutory injunction be set for hearing before such three-judge court on the earliest date practicable for the Court and counsel for the respective parties;

4. That in the event said motion for a temporary or interlocutory injunction shall not be determined prior to November 20, 1950, the effective date of said Order, a temporary restraining order be entered herein restraining, enjoining and suspending until further order of this Court the promulgation, operation and execution of said Order, to prevent irreparable injury and damage to plaintiffs;

5. That plaintiffs be permitted to file affidavits in support of such motion at any time up to a date five days before the date of such hearing and that defendants be permitted to file answering affidavits at any time up to a date one day before the date of the hearing, such motion to be heard on the verified complaint, the exhibits attached thereto and said supporting and answering affidavits;

6. That plaintiffs may have such other and further temporary relief as equity and justice shall require and as this Court shall deem appropriate under the circumstances.

October 24, 1950.

Weymouth Kirkland, Kirkland, Fleming, Green, Martin & Ellis, by Weymouth Kirkland, A Member of the Firm, Attorneys for Plaintiffs, Office and P. O. Address, 33 No. La Salle Street, Chicago, Illinois.

Of Counsel: Cahill, Gordon, Zachry & Reindel, New York City, John T. Cahill, Joseph V. Heffernan, John W. Nields.

[fol. 478] [File endorsement omitted]

[fol. 479-480] [File endorsement omitted]

IN UNITED STATES DISTRICT COURT

[Title omitted]

ORDER—Filed October 31, 1950

The undersigned Chief Judge of the Court of Appeals for the Seventh Circuit, having been notified by Honorable Philip L. Sullivan, United States District Judge for the Northern District of Illinois, Eastern Division, of an application for injunction and other relief in the above entitled cause, does hereby, pursuant to Sec. 2284 of the Revised Judicial Code, designate the Honorable J. Earl Major, Circuit Judge of the United States Court of Appeals for the Seventh Circuit, and the Honorable Walter J. LaBuy, a United States District Judge for the Northern District of Illinois, Eastern Division, to serve as members of a three-judge district court to hear and determine the above-designated action or proceeding now set for hearing on Tuesday, November 14, at 10:30 a. m., and for such further time as may be required.

Dated this 30th day of October, 1950.

J. Earl Major, Chief Judge, U. S. Court of Appeals.

[fol. 481] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

MOTIONS TO DISMISS THE COMPLAINT OR, IN THE ALTERNATIVE, FOR SUMMARY JUDGMENT—Filed October 30, 1950

Upon the complaint herein and upon the annexed affidavit of Benedict P. Cottone, sworn to the 27th day of October, 1950, and upon all the other papers and proceedings heretofore filed and had herein, the defendants in the above-entitled cause move this Court that the complaint be dismissed or, in the alternative, for summary judgment in their favor.

A. The grounds of the motion to dismiss the complaint with respect to plaintiffs National Broadcasting Company, Inc. and RCA Victor Distributing Corporation are:

1. Plaintiffs National Broadcasting Company, Inc. and RCA Victor Distributing Corporation fail to state a claim

upon which relief can be granted in that, among other things, no legal damage is alleged.

2. The Court lacks jurisdiction over the subject matter of the claims asserted by National Broadcasting Company, Inc. and RCA Victor Distributing Corporation. These plaintiffs lack standing to bring this action and therefore no justiciable controversy with respect to them is presented by their complaint.

B. The grounds of the motion to dismiss the complaint with respect to plaintiff Radio Corporation of America are:

Plaintiff Radio Corporation of America fails to state a claim upon which relief can be granted.

[fol. 482] C. The grounds of the motion for summary judgment are:

Even if the Court have jurisdiction of the subject matter of this action with respect to all plaintiffs, the complaint together with the exhibits thereto annexed, the affidavits submitted on this motion together with the exhibits thereto annexed, and the other papers and proceedings heretofore filed and had herein, show, as to each and every of the plaintiffs, that there is no genuine issue as to any material fact and that defendants United States of America and the Federal Communications Commission are entitled to a judgment as a matter of law.

Dated: Washington, D. C., October 27, 1950.

John F. Baecher, Special Assistant to the Attorney General, Attorney for the United States; Benedict P. Cottone, General Counsel; Max Goldman, Assistant General Counsel; Stanley S. Neustadt, Daniel R. Ohlbaum, Robert D. Greenberg, Counsel, Attorneys for the Federal Communications Commission.

William Amory Underhill, Acting Assistant Attorney General; James E. Kilday, Special Assistant to the Attorney General; Otto Kerner, Jr., United States Attorney for the Northern District of Illinois, Attorneys for the United States.

[fol. 483] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

AFFIDAVIT OF BENEDICT P. COTTONE—Filed October 30, 1950

DISTRICT OF COLUMBIA
City of Washington, ss:

1. He is General Counsel of the Federal Communications Commission and as such is familiar with the Commission's proceedings with respect to color television taken pursuant to the Commission's Notice of Further Proposed Rule Making issued July 11, 1949, and that the proceedings included the following:

BENEDICT P. COTTONE, being duly sworn says:

(a) These proceedings relating to color television are part of a more comprehensive rule making hearing involving study and review of the existing commercial television service which occupies 12 channels in the frequency band 54 Mcs. to 216 Mcs. (the Very High Frequency Band, or VHF), (Dockets 8736 and 8975), a review of the status of television experimentation and development in the experimental frequency band 470 to 890 Mcs. (the Ultra High Frequency Band, or UHF), (Docket 8976), with a view to opening this portion of the spectrum for regular television operations and the amendment of the Commission's Rules, Regulations and Engineering Standards concerning the television broadcasting services, (Docket 9175).

(b) The color phase of the instant proceedings was instituted by the Commission's Notice of Further Proposed Rule Making, issued July 11, 1949. While in this notice the Commission did not propose specific amendments to its rules and standards looking toward the commercialization of color television, in Appendix A to the Notice the Commission described the conditions upon which it would consider proposals for a change in transmission standards on Channels 2 through 55 looking toward the establishment of color television. Paragraph 13(a) of the Notice stated:

[fol. 484] "13.(a) Appendix A hereto describes the conditions upon which the Commission will receive proposals for a change in Transmission Standards on Channels 2 through 55, looking toward the establishment

of color television. Persons with relevant information, especially those who have heretofore supplied information concerning color television or have demonstrated experimental color operation to the Commission, should file proposals in accordance with Appendix A and should be prepared to submit information concerning color breakup, flicker, color fringing, image registration, color fidelity, picture brightness, camera light efficiency, definition, field tests, and details with respect to modification of transmitters and receivers to provide the degree of compatibility contemplated by Appendix A, paragraph II-C-2."

Paragraphs II-B and C of Appendix A stated:

"B. The Commission will give consideration to proposals for a change in Transmission Standard on channels 2 through 55 looking toward color television or other television systems. Any such proposal shall:

1. Be specific as to any change or changes in the Transmission Standards proposed; and

2. Shall contain a showing as to the changes or modifications in existing receivers which would be required in order to enable them to receive programs transmitted in accordance with the new standards.

"C. It is proposed to consider changes in Transmission Standards for Channels 2 through 55 only upon a showing in these proceedings that:

1. Such system can operate in a 6-megacycle channel; and

2. Existing television receivers designed to receive television programs transmitted in accordance with present transmission standards will be able to receive television programs transmitted in accordance with the proposed new standards simply by making relatively minor modifications in such existing receivers."

(c) Pursuant to the above notice, comments relating in whole or in part to color television were filed by the Joint Technical Advisory Committee (JTAC); the Radio Manufacturers Association (Radio Manufacturers Association has changed its name to Radio and Television Manufactur-

ers Association); the Radio Corporation of America (RCA); the Columbia Broadcasting System, Inc. (CBS); Color Television, Incorporated (CTI); Charles Willard Geer; Leon Rubenstein; Philco Corporation; and Allen B. DuMont Laboratories, Inc. Webster-Chicago Corporation and American Television, Inc. also were made parties to the hearing upon their request. Celomat Corporation was permitted to testify in the hearing on its own behalf. CBS, CTI and RCA were the only parties who appeared as proponents of their own color television systems.

[fol. 485] (d) The hearing on the color issues was held before the Commission *en banc* commencing September 26, 1949 and ending May 26, 1950— a total of 62 hearing days, covering 9,717 pages of transcript. In all, 53 different witnesses and 265 exhibits were offered. The breakdown of the number of witnesses called and exhibits introduced by each of the parties to the hearing was as follows:

(1) Eight witnesses were called by RCA. Their testimony fills 2,183 pages of transcript and they introduced 67 exhibits.

(2) Twenty-three witnesses appeared on behalf of CBS and their testimony fills 2,368 pages of transcript. CBS also introduced 77 exhibits.

(3) CTI called six witnesses and their testimony fills 1,169 pages of the transcript. CTI introduced 56 exhibits.

(4) Four witnesses were called on behalf of the FCC and their testimony fills 286 pages of the transcript. The Commission also introduced 28 exhibits.

(5) RMA called four witnesses at the hearings. Their testimony fills 727 pages of the transcript and RMA introduced 9 exhibits.

(6) Two witnesses testified on behalf of Allen B. DuMont Laboratories, Inc. and their testimony fills 1,031 pages of the transcript. DuMont introduced 13 exhibits.

(7) American Television, Inc. called two witnesses, whose testimony fills 68 pages of the transcript, and introduced one exhibit.

(8) One witness testified on behalf of the American Telephone & Telegraph Co. and his testimony fills 127 pages of the record. The Company also introduced 3 exhibits.

(9) The Joint Technical Advisory Committee (JTAC) called one witness whose testimony fills 361 pages of the record. One exhibit was also introduced by JTAC.

(10) Celomat Corporation called one witness on its own behalf and his testimony fills 37 pages of the record. Celomat introduced 2 exhibits.

(11) One witness testified for Philco Corporation, filling 568 pages of the transcript and introduced 2 exhibits.

[fol. 486] (12) Western Union called one witness whose testimony fills 47 pages of the record and introduced one exhibit.

(13) Charles Willard Geer testified on his own behalf filling 113 pages of the transcript and introduced one exhibit.

(14) Raymond M. Wilmotte also testified, his testimony filling 72 pages of the transcript and introduced 4 exhibits.

(e) The hearing was held in two phases, the first of which ended on November 22, 1949, at which time the hearing was continued to February 6, 1950, later extended to February 20, 1950. The second phase commenced on February 20, 1950 and ended on May 26, 1950. During the intervening period between the first and second phase of the hearing, the parties conducted field tests of color television systems pursuant to the Commission's "Notice Concerning Field Test Programs and Further Testimony", adopted November 21, 1949. Progress reports concerning these field tests were filed with the Commission during December, 1949 and January, 1950, by RCA, CBS and CTI. The hearings were held in Washington, D. C., except for the second comparative demonstrations of the CBS, RCA and CTI color television systems which were held on February 23, 1950 at the Commission's Laboratories at Laurel, Maryland; the CBS demonstration of horizontal interlace held on April 26, 1950 at the CBS Laboratories in New York City; and the CTI demonstration held on May 17, 1950 at San Francisco, California.

(f) During the course of the hearing, the following demonstrations were conducted on the record of the proceedings:

(1) On October 6 and 7, 1949, CBS demonstrated its color system at the Carlton Hotel, Washington, D. C.

(2) On October 10, 1949, RCA demonstrated its color system at the Washington Hotel and the Wardman Park Hotel, Washington, D. C.

(3) On November 21 and 22, 1949, a comparative demonstration was conducted at Temporary "E"

Building, Washington, D. C., showing the operation of the CBS color system, the RCA color system, and conventional DuMont monochrome television receivers. At this demonstration, the Commission demonstrated a conventional Bendix television receiver equipped with the automatic adapater invented by members of the Commission's staff.

(4) On February 20, 1950, CTI demonstrated its color system at the Statler Hotel, Washington, D. C.

[fol. 487] (5) On February 23, 1950, a second comparative demonstration was conducted showing the operation of the CBS color system, the RCA color system, and the CTI color system, at the Commission's Laboratories at Laurel, Maryland.

(6) On April 6, 1950, RCA demonstrated its trichromatic (three-color) receiving tubes at the Trans-Lux Building, Washington, D. C.

(7) On April 26, 1950, CBS demonstrated its horizontal interlace at the CBS Laboratories in New York City.

(8) On May 17, 1950, CTI demonstrated its color system at the St. Francis Hotel, San Francisco, California.

(g) Pursuant to the Commission's Notice of May 10, 1950, the parties were permitted to file Proposed Findings and Conclusions on or before June 26, 1950, and replies thereto by July 10, 1950. Proposed Findings and Conclusions, and Replies were filed by Color Television, Incorporated (CTI), the Columbia Broadcasting System, Inc. (CBS), and the Radio Corporation of America (RCA). Paramount Television Productions, Inc. and Chromatic Television Laboratories, Inc., jointly filed Proposed Findings and Conclusions and a Reply as *amicus* pursuant to the Commission's letter of May 31, 1950.

(h) On September 1, 1950, the Commission issued its First Report covering the color television issues in these proceedings, in which it made detailed findings and conclusions concerning the three color television systems which were proposed to the Commission at the hearings and in which it set forth minimum criteria which a color system would have to meet in order to be considered eligible for adoption. In this Report the Commission found that the line sequential system proposed by CTI and the dot sequen-

tial system proposed by RCA fell short of the criteria established by the Commission as the indispensable minimum for the adoption of a color television system. The Commission further found that the field sequential system proposed by CBS did satisfy those criteria. The Commission did not in its First Report finally adopt the CBS color system. Instead, it set forth a procedure whereby, if the *status quo* on compatibility were maintained, a decision would be postponed so that the Commission could give further consideration to four matters—large-size direct-view tubes on the CBS system, horizontal interlace, long persistence phosphors, and the development of new com- [fol. 488] patible systems and improvements in existing compatible systems which have been informally called to the Commission's attention since the conclusion of the hearing. The Commission's First Report suggested a method whereby the *status quo* on compatibility could be maintained. This method was the incorporation of brackets into receivers hereafter manufactured which would permit such receivers to receive black and white pictures from present transmissions, CBS color transmission and any other transmissions within a range of 15,000 to 32,000 lines per second and 50 to 150 fields per second which would be specified in bracket standards for black and white television broadcasting.

(i) Concurrently with the First Report the Commission issued a Second Notice of Further Proposed Rule-Making providing for the adoption of bracket standards in the existing monochrome television system and invited interested parties and all manufacturers to submit comments on the proposal. During September, 1950, comments on the proposed bracket standards were received from 33 interested parties and television receiver manufacturers which indicated that the television receiver manufacturers were unwilling or unable to manufacture receivers with bracket standards within the time proposed by the Commission. On August 29, 1950, CTI filed a Motion to Reopen the Record and Take Further Testimony. On October 4, 1950, RCA filed a petition requesting that the Commission review the improvements made in the performance of the RCA color system and that the Commission view further experimental broadcasts of the three propo ed color sys-

tems before reaching a final determination with respect to color standards.

(j) Thereafter, on October 10, 1950, the Commission issued its Second Report in these proceedings, which found that the field sequential color system should be adopted. In its Report, the Commission contemplated further experimentation on color television by interested persons. Simultaneously with the Second Report, the Commission issued an Order amending the Commission's Standards of Good Engineering Practice, to provide for standards for color television transmission in accordance with the proposed field sequential system, effective November 20, 1950. Commissioners Sterling and Hennock dissented from the Second Report and the Order amending the Standards of Good Engineering Practice.

[fol. 489] (k) In addition, the Commission issued two orders on October 10, 1950 which respectively denied the petition of CTI to reopen the Record and take further testimony and the RCA petition to postpone a final determination of the color proceedings and to have further demonstrations of the three proposed color systems. Commissioners Sterling and Hennock concurred in the issuance of these two orders.

2. A certified copy of said portions of the proceedings before the Commission in Dockets 8736, 8975, 9175 and 8976 which relate to color television is filed herewith and incorporated herein by reference as Exhibit A.

3. One of the grounds urged by plaintiffs in support of their contention that the Commission's Order of October 10, 1950 adopting the color television standards is illegal, void and beyond the power and jurisdiction of the Commission is that the Commission's staff engineer who invented a device usable in the CBS color system, although he foreswore any financial interest in his device by assigning it to the United States Government, had his professional prestige and reputation at stake which could be furthered only if the CBS system were adopted; that the Commission relied on said engineer's advice; that he gave such advice in the absence of the parties and participated in the formulation and preparation of its Reports and the Order complained of and that, on the basis of the facts dis-

closed, said engineer should not have been permitted to continue in the hearings.

4. Affiant submits that Exhibit A is relevant to the above issue sought to be raised and it shows:

(a) That plaintiffs have not alleged that the actions of said staff engineer are in violation of law.

(b) That the hearing in these proceedings, when the device invented by said engineer in the course of his government employment and patented by the Government, was put into evidence (Exhibit 296), the attorney for RCA stated (P. 5982 of the transcript of the hearing included in Exhibit A):

> "Mr. McDaniel: Mr. Chairman, I have said all I think I need to say. There has been no development here by the Commission's engineering staff that I know of with reference to any other system. There are two other contestants in the case proposing color systems, and it is a matter of appearance more than anything else. We just think it is a little bit out of order."

[fol. 490] (c) That at the time the device invented by said engineer in the course of his government employment and patented by the Government, was introduced in evidence at the hearing, RCA had full opportunity to object to the continued participation of said engineer in the proceedings but did not do so nor did they raise such an objection at any other time during the hearing or in any of the pleadings or comments filed by RCA with the Commission.

(d) That it raises no genuine issue as to any material fact.

(e) That it has not been alleged by plaintiffs that participation of said engineer in the Commission's consideration of the record in which other engineers on the Commission's staff also participated is in violation of the Administrative Procedure Act, which provides that the provisions of Section 5(c) of that Act (5 U.S.C. 1004 (c)) relating to separation of functions shall apply to agency proceedings pursuant to Section 8 of that Act (5 U. S. C. 1007), but not to rule-making proceedings.

(f) That plaintiffs have made no allegations of bias or prejudice on the part of the Commission.

5. That the further grounds urged by plaintiffs in support of their contention that the Commission's Order adopting the color television standards is illegal, void and beyond the power and jurisdiction of the Commission are as follows:

(a) The Order is contrary to the public interest, convenience and necessity, the basic statutory standard contained in the Communications Act of 1934.

(b) The Order violates Section 303(g) of the Communications Act of 1934.

(c) The Order is unsupported by substantial evidence, is arbitrary and capricious, and is an abuse of discretion.

(d) The Order was adopted before the Commission had discharged its statutory duty to inform itself adequately before issuing a final order in a rule-making proceeding. The Commission wrongfully refused to consider additional evidence of determinative significance to its decision and wrongfully denied the RCA Petition.

(e) The Order is based upon the rejection by the television industry of the two illegal conditions set forth in the first Report.

[fol. 491] (f) The Order is contrary to the terms of the Commission's Notice of July 11, 1949, pursuant to which the hearings on which the Order purports to be based were held.

(g) The Order deprives the plaintiffs of property without due process of law, contrary to the Fifth Amendment to the Constitution of the United States.

6. Affiant submits that Exhibit A is relevant to the above issues sought to be raised and that it shows that the order is within the Commission's authority conferred by the Communications Act of 1934, as amended; that it is based upon a consideration of all the evidence presented to the Commission and supported by substantial evidence; that it is in accordance with the Commission's Notice of July 11, 1949, pursuant to which the hearings on which the Order is based were held; that it is proper and reasonable and in the public interest, convenience and necessity; that it did not deprive plaintiffs of their property without due

process of law; and that there is no genuine issue as to any material fact.

Benedict P. Cottone.

Subscribed and sworn to before me this 27th day of October, 1950. Forest L. McClenning, Notary Public. My commission expires January 15, 1953. (Seal.)

[fols. 491a-492] [File endorsement omitted.]

[fol. 493] IN THE UNITED STATES DISTRICT COURT

NOTICE—Filed November 14, 1950

The Honorable John Howard McGrath, Attorney General of the United States of America, Department of Justice, Washington, D. C.

Federal Communications Commission, Washington, D. C.

Honorable Otto Kerner, Jr., United States Attorney for the Northern District of Illinois, U. S. Court House, Chicago, Illinois.

Mr. Weymouth Kirkland and Kirkland, Fleming, Green, Martin & Ellis, Attorneys for Plaintiffs, 33 N. LaSalle St., Chicago, Illinois.

Please take notice that on Wednesday, the first day of November, 1950, at the hour of 10 o'clock in the forenoon, or as soon thereafter as counsel may be heard, we shall appear before the Honorable Philip L. Sullivan, United States District Judge, at his Courtroom in the United States Court House, 225 South Clark Street, Chicago, Illinois, or before such other judge of said court as may be hearing matters in his place and stead and shall at said time and place present the motion of Pilot Radio Corporation to intervene as a Plaintiff in the above entitled cause, a copy of said motion together with a copy of the proposed complaint of Pilot Radio Corporation being herewith served upon you, and shall move for the entry of an order granting said motion to intervene and ruling upon the parties in interest, to plead to the complaint of said Pilot Radio Corporation.

At which time and place you may appear if you so see fit.

Mnuchin & Smith, 33 West 42nd Street, New York City, N. Y.; Schapiro and Schiff, 38 S. Dearborn Street, Chicago, Illinois, Attorneys for Applicant for Intervention.

[fols. 494-495] Received a copy of the above and foregoing notice together with a copy of a motion to intervene and of the proposed complaint of Pilot Radio Corporation, this 30th day of October, 1950, before the hour of 4 p. m.

Kirkland, Fleming, Green, Martin & Ellis, by W. K. Otto Kerner, Jr., for

STATE OF ILLINOIS,
County of Cook, ss:

Ann Stritar, being first duly sworn on oath deposes and says that she served the above and foregoing notice together with the copy of motion to intervene and copy of the proposed complaint of Pilot Radio Corporation on John Howard McGrath, Attorney General of the United States of America and Federal Communications Commission by depositing true copies of the same in envelopes addressed to said parties at the respective addresses appearing on said notice, by registering and depositing same in the United States Post Office at Adams and Dearborn Streets, at the hour of approximately 5 PM on Friday, October 27, 1950, postage prepaid.

Ann Stritar.

Subscribed and sworn to before me this 31st day of October, 1950. Lillie A. Love. [Seal]

[fol. 496] UNITED STATES DISTRICT COURT

[Title omitted]

MOTION TO INTERVENE AS A PLAINTIFF—Filed November 14, 1950

To the Judges of the District Court of the United States, for the Northern District of Illinois, Eastern Division:

Pilot Radio Corporation moves to intervene as a plaintiff in the above entitled action on the grounds set forth hereinbelow:

1. Petitioner is a corporation engaged in the manufacture of television receivers and has its principal place of business at 37-06 Thirty-sixth Street, Long Island City 1, New York.

2. The above entitled cause was commenced in this Court by the filing of a complaint on October 17, 1950.

3. Said complaint seeks to have a certain order of the Federal Communications Commission approving the CBS color television system declared null and void and the promulgation, operation and execution thereof restrained [fol. 497] and enjoined.

4. Petitioner is interested in the above entitled action in that it has been adversely affected by said order of the Federal Communications Commission and has suffered and will continue to suffer damage as a result thereof unless said order is enjoined and set aside, all as more fully set forth in petitioner's proposed complaint herein (said complaint being the same complaint heretofore filed by petitioner in the United States District Court for the Eastern District of New York and then withdrawn in order to permit petitioner to intervene herein), a copy of which is attached hereto.

5. Petitioner has the right, conferred by statute of the United States, to intervene in this action; see Communications Act of 1934 as amended (48 Stat. 1064, 1093, 63 Stat. 108; 47 U.S.C. Section 402 (a)) and the provisions of Title 28 of the United States Code relating to suits to set aside and enjoin orders of the Interstate Commerce Commission (28 U.S.C., Sections 2321 to 2325, inclusive).

Pilot Radio Corporation, by Isidor Goldberg, President, Applicant for Intervention. A. L. Schapiro, B. C. Schiff, Schapiro and Schiff, 38 S. Dearborn

Street, Chicago, Illinois. Leon Mnuchin, Jerome S. Zurkow, Mnuchin & Smith, 33 West 42nd St., New York 18, New York, Attorneys for Applicant for Intervention.

[fols. 498-499] *Duly sworn to by Isidor Goldberg, jurat omitted in printing.*

[fol. 500] [File endorsement omitted]

[fol. 501] IN UNITED STATES DISTRICT COURT

[Title omitted]

INTERVENING COMPLAINT—Filed November 14, 1950

Pilot Radio Corporation, a New York corporation, leave of Court first had and obtained, intervenes in the above entitled cause and for its complaint herein alleges:

1. This is an action to enjoin, set aside, annul and suspend an order of the Federal Communications Commission (hereinafter sometimes referred to as the "Commission") which was issued on or about October 11th, 1950, concurrently with a certain "Second Report of the Commission," for the reasons set forth in said Second Report and in a certain "First Report of the Commission" dated September 1st, 1950. That said Order and said Reports are hereinafter attached as Exhibits A, B and C respectively.

2. This action is brought by Pilot Radio Corporation (hereinafter sometimes referred to as the "intervenor" or the "plaintiff") pursuant to the provisions of the Communications Act of 1934 (48 Stat. 1064, 1093; Code of Laws of the U. S., Title 47, Section 402a), of Title 28 of said Code of Laws of the U. S. relating to the enforcing or setting aside of the orders of the Interstate Commerce Commission (Sections 2321 to 2325 inclusive, of said Title 28), and of Section 2284 of said Title 28 and under the general equitable jurisdiction of this Court.

[fol. 502] 3. Plaintiff, Pilot Radio Corporation, is a corporation organized and existing under the laws of the State of New York, having its principal place of business at 37-06 Thirty-sixth Street, Long Island City 1, New York, in the Eastern District of New York.

4. The Commission is an administrative tribunal created by said Communications Act of 1934 and is charged with the administration and enforcement of said Act.

5. The United States of America is made a defendant in this suit pursuant to the provisions of the said Communications Act of 1934 and of said Title 28, Section 2322.

6. Plaintiff is a corporation engaged in the manufacture of electronic products including television receivers. Plaintiff and its predecessors have been engaged in business since 1919 and plaintiff is one of the pioneers in the field of television. As a manufacturer of television receivers, plaintiff is vitally, and as hereinafter set forth, adversely affected by the said order of the Commission, Exhibit A annexed hereto.

7. The Commission, charged with the administration and enforcement of the Communications Act of 1934, as aforesaid is required, among other things, to encourage a larger and more effective use of radio and perforce television in the public interest. The commission, accordingly, is required to be satisfied that any proposed new system is as good as any system can be expected to be within a reasonable time in the foreseeable future; the Commission must give consideration to improvements in the art of broadcasting and telecasting, protect the public from having [fol. 503] foisted upon its methods of transmission which are insufficiently developed and inadequate, which would lead to useless and unnecessary expenditures by the public and which would render existing receiving sets in the hands of the public useless unless expensive equipment is added thereto, and, in general, in the exercise of the powers and authorities vested in it, act with due regard to whether the public interest, convenience and necessity would be served thereby and in a manner which is not capricious and arbitrary. The Commission in the administration and enforcement of said Act is required to exercise its discretion in a reasonable manner and to base its decisions and orders on good and convincing reasons and substantial evidence, as distinguished from hope and speculation.

8. The said order, Exhibit A, was issued in violation of the requirements alleged in Paragraph 7 hereof, is illegal, void and unreasonable and is beyond the power and authority of the Commission to impose, in that, among other things, it is arbitrary and capricious, contrary to public

interest, and was issued without regard to whether the public interest, convenience of necessity will be served thereby, all for the reasons hereinafter set forth.

9. Notwithstanding the fact that the Commission has no power to regulate or control the manufacture of television receivers, the Commission in its First Report, Exhibit C, sought to achieve such control by threatening the television manufacturing industry, including the plaintiff, that the Commission would approve a color system, namely, that of CBS, which was not yet ready for commercialization and which was far from satisfactory, as hereinafter alleged, [fol. 504] and therefore unacceptable to television manufacturers, unless such manufacturers assured the Commission that they would incorporate in all television receivers to be built certain proposed "bracket standards" which would permit the reception of color transmission in black and white if an incompatible system were thereafter adopted. The terms "bracket standards" and "incompatible system" are defined in said Exhibit C. That said demands were not only unlawful and beyond the authority of the Commission, but they also were arbitrary and unreasonable in that, among other things, they required compliance therewith within time limits which were physically impossible to meet, all of which was known to and ignored by, the Commission.

10. That upon the failure of the television industry to give the aforesaid demanded assurances and in pursuance of its aforesaid threats, the Commission issued the said order, Exhibit A.

11. That said CBS system was approved by the Commission although it conceded that further testing and more information was required with respect to essential factors pertaining thereto.

12. The approval by the Commission of the CBS color television system was expressly predicated by the Commission upon hope and speculation and the ephemeral belief that further experimentation and possible improvements would subsequently justify the Commission's decision, and notwithstanding the fact that the Commission had found said CBS system inadequate and unsatisfactory as measured by the Commission's own criteria.

13. The CBS color television system approved by the Commission, as aforesaid, is substantially the same system which had been disapproved by the Commission in its report

dated March 18th, 1947, a copy of which is hereto annexed [fol. 505] as Exhibit D, and the reasons for such disapproval are still applicable.

14. The said CBS system, as the Commission recognized in said Reports, is not usable in connection with television receivers with a tube larger than 12½ inches, although the trend of the public is to purchase sets which are larger than 12½ inches. Despite the progress of the television industry to, and the demand by the public for, larger type receivers the Commission is seeking to enforce a regression of standards and to foist upon the public an inferior size of television receiver.

15. Television receivers are incapable of any reception of the CBS color transmission unless there is added to said sets an adapter, in order to provide reception of black and white on the CBS color transmission, plus a converter in order to receive color on the CBS color transmissions. By reason thereof, the Commission has rendered all existing television receivers obsolescent and completely us-less unless there is added the aforesaid adapter in order to receive such transmission in black and white plus a converter if colored reception is desired.

16. The CBS system was approved by the Commission, as aforesaid, even though the Commission found that black and white reception of the CBS transmission is inferior to present monochrome standards. The term "monochrome standards" is defined in Exhibit C.

17. The Commission, in its said Reports, Exhibits B and C, expressly recognized that there are current significant developments and improvements in the field of color television which could render said CBS system archaic and inferior and any order approving such system contrary to public interest. Nevertheless, the Commission arbitrarily [fol. 506] refused to permit further and sufficient time for study and demonstration of such developments and improvements.

18. The said order of the Commission, Exhibit A, is not predicated upon the fact that the said CBS system is as good as can be expected within a reasonable time in the foreseeable future.

19. The Commission, in presently approving a system which it had found far from satisfactory, alleged as the

reason therefor fear that the problem of incompatibility would be aggravated by further delay in that the number of black and white receivers in the hands of the public would continue to grow so that should an incompatible system be eventually adopted, more sets would require external adapters. Said alleged basis for the issuance of said order, Exhibit A, is untenable and without foundation in fact, inasmuch as there is no appreciable difference between the cost of an external adapter and the increased cost of building new sets for internal adapters. The approval of the CBS color transmission system, without proper foundation therefor, as herein alledge, will accordingly, unless enjoined and annulled, as herein prayed for, impose upon the public useless and unnecessary expenditures for external and internal adapters and like expenditures by the public for converters and furthermore, will compel the television manufacturing industry, including the plaintiff, to revamp its production facilities, methods and practices, at considerable trouble and expense, as hereinafter alleged in Paragraph 22 of this Complaint, all of which is useless and unnecessary and not in the public interest.

20. By the terms of the said order, Exhibit A, the same will become effective on November 20th, 1950, unless en- [fol. 507] forcement thereof is stayed, suspended or annulled pursuant to the prayer for relief stated herein.

21. Said order, Exhibit A, already has worked and will continue to work irreparable damage and injury upon plaintiff in the conduct of its business, as hereinafter alleged.

22. The plant and facilities of the plaintiff are designed and set up for the production of television receivers capable only of receiving under the present monochrom- system and plaintiff has a substantial investment therein. In order to manufacture sets capable of receiving the CBS color transmission, it is necessary for plaintiff to disrupt its present production, to redesign and retool its equipment and facilities, and to re-train its personnel, all of which will involve a substantial outlay of money and effort and will place a severe burden and hardship on the plaintiff.

23. Plaintiff has completed and has on hand and in process of manufacture sets capable of receiving black and white transmission only and dealers and representatives of

the plaintiff have on hand like sets of plaintiff's manufacture for sale to the public.

24. Upon the publication of said order of the Commission, Exhibit A, on or about October 11th, 1950, and as a result thereof, plaintiff began to receive and has continued to receive cancellations of previously placed orders for its black and white television receivers, and the normal amount of new orders for its said type of television receivers has already been sharply reduced. Likewise, as a result of said order, plaintiff's said dealers have already received a large number of cancellations from customers who had placed orders for plaintiff's said sets, and new retail purchases [fol. 508] thereof have likewise been reduced. Plaintiff and its dealers find themselves burdened with a large stock of black and white television sets which have been rendered unsaleable as a result of said order and the conditions herein alleged are becoming and will become progressively worse. The resultant financial loss to plaintiff and its dealers has been considerable and will increase, and plaintiff's loss of good will and reputation, achieved after upwards of thirty-one years in the field of electronic production, will be irreparable, as hereinafter alleged.

25. Unless the order of the Commission, Exhibit A, is set aside and voided as herein requested, plaintiff, in order to continue in business will be compelled to manufacture television receivers capable of receiving CBS color transmission despite the inadequacies, limitations and deficiencies of the CBS color system, and despite the arbitrary and capricious nature of the Commission's order approving the CBS system, and despite the impending developments and improvements which the Commission refused to consider, and which could result in an early discarding of the CBS color system and an early rendering of sets designed to receive CBS color transmission obsolete, all as herein alleged.

26. Plaintiff, as a manufacturer, is dependent upon the good will of the public and its acceptance of plaintiff's product. A sale by the plaintiff of television receivers constitutes, in effect, a representation to the public that such sets are perfected, and an assurance that the same will be of continuous use and service for reasonable duration. In reliance upon such representation and assurance the public pays a substantial price for each television receiver, which,

amortized over the useful life of the television receiver, is reasonable and not excessive, but which would be wasteful and excessive if such television set were rendered obsolete in the near future.

[fol. 509] 27. By reason of the deficiencies and limitation of the CBS color system, as hereinabove alleged, any receivers to be manufactured by plaintiff capable of receiving the CBS color transmission will necessarily suffer from the same deficiencies and limitations and, further, will be subject to early obsolescence in the event current developments and improvements lead to the adoption of a color system different from that of CBS.

28. By reason of the premises, plaintiff will suffer irreparable damage to its good will and reputation.

29. Prior to the adoption of the said order, Exhibit A, plaintiff submitted to the Commission its objections to its proposed order, a copy of said objections being hereto attached as Exhibit E, but that the Commission wholly disregarded the same. The reasons and arguments advanced in said Exhibit E are reiterated and realleged herein as further bases for plaintiff's claim to relief.

30. By reason of the foregoing, plaintiff is suffering, and unless the said order, Exhibit A, be enjoined and suspended, will continue to suffer substantial and irreparable harm to its business, good will and reputation. That no adequate remedy at law exists except by this action.

Wherefore, intervenor prays.

(a) That the specially constituted Court of three judges convened to hear this matter issue a temporary or interlocutory injunction herein restraining, enjoining and suspending until the further order of this Court, the operation, execution and enforcement of the said order of the Commission, Exhibit A.

[fol. 510] (b) That after a final hearing, this Court adjudge order and decree that the said order, Exhibit A, was at all times beyond the lawful authority of the Commission, in violation of the legal rights of the plaintiff, wholly void, arbitrary and unreasonable and that said order be perpetually vacated, set aside, suspended and annulled, and the enforcement thereof perpetually restrained and enjoined.

(c) That the intervenor have such other and further relief in the premises as to this Court may appear just and proper under the circumstances.

Mnuchin & Smith, Office & P. O. Address: 33 West 42nd Street, Borough of Manhattan, City of New York, by Harry K. Smith, A Member of the Firm. Schapiro & Schiff, Office & P. O. Address: 38 S. Dearborn Street, Chicago, Illinois, by B. E. Schiff, A Member of the Firm; Attorneys for Intervenor.

[fols. 511-518] *Duly sworn to by Isidor Goldberg. Jurat omitted in printing.*

[fols. 519-522] EXHIBIT "A"

Omitted. See exhibit "H". Printed side page. 409 ante.

[fols. 523-538] EXHIBIT "B"

Omitted. See exhibit "G". Printed side page. 443 ante.

[fols. 539-721] EXHIBIT "C"

Omitted. See exhibit "B". Printed side page. 107 ante.

[fol. 722] EXHIBIT "D" TO INTERVENING COMPLAINT

Federal Communications Commission
Washington 25, D. C.

Docket No. 7896

In the Matter of Petition of COLUMBIA BROADCASTING SYSTEM, INC., for Changes in Rules and Standards of Good Engineering Practice Concerning Television Broadcast Stations

Report of the Commission

(Adopted March 18, 1947)

I

This proceeding arises upon the petition of Columbia Broadcasting System, filed on September 27, 1946, request-

ing the Commission to authorize the operation of commercial color television stations in the frequency band 480 to 920 megacycles and to amend its Standards of Good Engineering Practice Concerning Television Broadcast Stations in specified particulars so as to permit operation of color television stations on the basis of the system developed by Columbia. The portion of the radio spectrum to which the petition refers—480 to 920 megacycles—is at the present time allocated for experimental purposes in connection with television systems. Provision for television operation on a regular basis is made on Channels 1 to 13 which range from 44 to 216 megacycles; only black and white television pictures are transmitted on these channels. No change is proposed by Columbia with respect to television broadcasting on Channels 1 to 13.

In brief, the color television system proposed by Columbia provides for channels 16 megacycles wide, with color being transmitted sequentially. Under the proposed sequential system, each picture is scanned through separate color filters—red, green and blue, in turn. These transmissions in the separate colors follow each other at the rate of 48 times per second. These three color transmissions are accepted by the receiver by means of a color wheel containing filters of red, green and blue, which rotates in front of the television screen in synchronism with a similar color wheel at the transmitter. When the images of the three colors are so received, the eye is enabled to see the picture in full color.

It should be pointed out that the only color television system as to which Commission approval is requested in this proceeding is that proposed by Columbia. During the hearing Radio Corporation of America demonstrated another color television system. This is the so-called simultaneous system where each picture is scanned simultaneously in three colors—red, green and blue—and these transmissions [fol. 722] are sent simultaneously on three different channels and are combined at the receiver to produce a color image. Radio Corporation of America did not advance this system as one which should be approved at this time. R. C. A. stated that its system was still in the laboratory stage but presented it to the Commission as representing a system which could be developed for commercial use in four or five years and which, according to R. C. A. has many advantages over the sequential system.

Columbia requested that a hearing be held by the Commission on its petition so that it and other interested parties might present testimony of expert witnesses with respect to the matters in issue. Accordingly, the Commission on October 9, 1946 designated the petition for hearing. Hearings were held in Washington on December 9 through 13, 1946, in New York City on January 27 and 28, 1947, in Princeton, New Jersey, on January 29 and again in Washington on February 10 through 13, 1947. The hearings in New York and Princeton were for the purpose of permitting Columbia and the other parties to demonstrate their systems for the record.

Before proceeding to a consideration of the petition and the evidence adduced at the hearing, a brief discussion appears appropriate as to the necessity for Commission approval of standards. The question may be asked as to why, if Columbia has a system of color television which it believes is ready, and frequencies are available, it cannot offer its system to the public and let its competitors do the same thing with respect to their systems. The public would then decide which system, if any, it prefers. The point might be made that this is the way things are done if, for example, a company desires to bring out a new car, washing machine, or vacuum cleaner.

The answer lies in the nature of television and the fact that there are not enough frequencies available in the 480 to 920 megacycle band for more than one color television system. In television the receiver and transmitter are in effect components of one integrated system, or, expressed in another manner, the transmitter and receiver are related to each other as a lock and key. Unless they are both designed to meet certain fundamental standards, the receiver will be unable to accept the transmissions from the transmitter. For example, let us consider the method of transmitting the color. The method proposed by Columbia is the sequential method. R. C. A. has proposed as an alternative the simultaneous method. Still other possibilities exist. Receivers that are built for the sequential system would not be able to receive programs from television stations broadcasting on a simultaneous system or on another system.

The method of transmitting color is only one of the many fundamental standards that have to be fixed. In addition, mention might be made of number of lines, frame rate, type

of sound system, etc. In all of these cases, the receiver must be constructed to the same standards as the transmitter if they are to be able to receive the programs. If at any [fol. 724] time a broadcast company should change any one of the above standards, all the receivers which it previously serviced would immediately become useless. Unlike the automobile or vacuum cleaner which remains capable of operation after a new model is brought out, a change in any one of the fundamental standards at the transmitter would immediately make all receivers built for the old standards obsolete.

Thus, it is obvious that before permitting a new television service to become established on a regular basis, a decision must first be made on fundamental standards. Otherwise, manufacturers of receivers could not start to build receivers, and the public could not purchase receivers with any confidence that they would be able to receive programs from all television stations, or that their receivers would not become useless immediately after they were purchased if the existing stations should change any of the fundamental standards. Under these conditions, it is entirely unlikely that television receivers would be bought on any mass basis. The justification for allocating so much of the radio spectrum to television broadcasting—78 megacycles for Channels 1-13 and 440 megacycles for experimental television—is that television is an important medium for bringing news, education, culture and entertainment to large segments of the population. With the great demand for frequencies on the part of the other radio services which cannot be met in full, the Commission would not feel justified in allocating so many frequencies to television at the expense of the other radio services, if it were inevitably destined to be limited to small audiences.

Before approving proposed standards, the Commission must be satisfied not only that the system proposed will work, but also that the system is as good as can be expected within any reasonable time in the foreseeable future. In addition, the system should be capable of permitting incorporation of better performance characteristics without requiring a change in fundamental standards. Otherwise, the danger exists that the standards will be set before fundamental developments have been made, with the result that the public would be saddled with an inferior service, if the new changes were not adopted, or if they were adopted,

receivers already in the hands of the public would be rendered useless.

Judged by the foregoing test, the Commission is of the view that the standards for color television proposed by Columbia Broadcasting System should not be adopted. In the commission's opinion the evidence does not show that they represent the optimum performance which may be expected of a color television system within a reasonable time. The Commission bases this conclusion on two grounds. In the first place, the Commission believes that there has not been adequate field testing of the system for the Commission to be able to proceed with confidence that the system will work adequately in practice. Secondly, the Commission is of the opinion that there may be other systems of transmitting color which offer the possibility of cheaper receivers and narrower band widths that have not yet been fully explored. Both grounds will be discussed in greater detail further on in the report.

[fol. 725] II

Before approving a new system of television it is indispensable that there be an adequate program of field testing. Receivers and transmitters must be subjected to numerous tests over a long period of time and at a diversified set of locations and operating conditions so that operation under average home conditions is closely approximated. Without such field testing, there is no assurance that all fundamental defects have been eliminated. There is a great difference between the performance of a system in a laboratory with trained personnel and its operation in the home by the average citizen. In the history of electronics there have been developments which looked promising in theory and even in operation in the laboratory but which revealed such fundamental defects when subjected to adequate field testing that they had to be abandoned entirely.

The record in this case discloses that while Columbia has done an extensive amount of testing of its system, most of it has been in the laboratory or under controlled conditions. No extensive testing under widely varying circumstances has been attempted. For example, all experimentation has been confined to one station in New York City. Furthermore, from the record it does not appear that at any time have there been more than 15 receivers in operation and all

of those were in the hands of Columbia. In this connection, it might be pointed out that before standards were adopted for monochrome television, there were at least seven stations in operation in several cities and several thousand television receivers were outstanding, a good part of them in the hands of members of the public.

The Commission does not take the position that adequate field testing necessarily requires a large number of receivers. Much can be done with a relatively small number of receivers if they are tried out under sufficiently diverse conditions. However, as the following discussion will show, no such tests have been made. The Commission's insistence on adequate field testing is not based merely on the theoretical desirability of such testing or the fact that field testing in the past has disclosed fundamental defects in other systems. On the contrary, the discussion that follows shows that on many important matters as to which a decision must be made before standards can be adopted, there is insufficient evidence upon which the Commission can base a decision. In the Commission's opinion, more field testing is necessary before sufficient evidence exists upon which a decision can be premised.

(1) *Picture brightness and contrast*—The brightness with which a picture can be produced on a television screen is one of the most important performance characteristics of a television receiver. If inadequate brilliance is produced, the house must be darkened in much the same way as a movie theatre in order to be able to see the picture. This seriously restricts the usefulness of television in the home because most people will find it very difficult to make their rooms sufficiently dark during the daytime for satis- [fol. 726] factory viewing under these conditions and quite inconvenient to black out their homes at night. Hence, it is important that receivers be developed which are capable of operating satisfactorily in rooms with normal illumination.

Dr. Peter C. Goldmark, testifying for Columbia Broadcasting System, stated that Columbia had developed a receiver in its laboratory which was capable of producing 22

foot lamberts of illumination.[1] However, at the hearing in New York, none of its receivers developed more than 15 foot lamberts. In contrast, Allen B. DuMont Laboratories, Inc., demonstrated black and white direct-view receivers that produced an average highlight brightness as high as 750 foot lamberts and Philco Radio Corporation displayed a projection type of receiver which produced an average highlight brightness of approximately 35 foot lamberts.

Dr. Goldmark testified that these differences in brightness were not significant because in his opinion the brightness of the Columbia picture was adequate and that the added brightness was, therefore, not necessary. Moreover, according to Dr. Goldmark, once adequate brightness has been provided for, it is more important to concentrate on contrast in the picture than on added brightness. By "contrast", Dr. Goldmark refers to the relative difference between the whitest white and blackest black in a picture. According to Dr. Goldmark, a ratio of at least 30 to 1 in contrast is needed if a satisfactory picture is to be produced.

To illustrate the point, let us assume that in a given room 10 foot lamberts are reflected from the television screen as a result of ambient light. In order to have a contrast ratio of 30 to 1 the receiver must be capable of producing a highlight brightness of 300 foot lamberts. In the case of the Columbia receiver, no such problem is involved according to Dr. Goldmark. This is because the color filter in front of the television screen absorbs much of the ambient light. The filter presently in use transmits 10% of the light. Hence, if the ambient illumination is 10 foot lamberts, the filter permits only 1 foot lambert to penetrate through to the screen and this in turn in being reflected is reduced to 0.1 foot lamberts as it passes through the filter a second time. In order to give a contrast ratio of 30 to 1 the receiver should be capable of producing a highlight brightness of 3 foot lamberts.

[fol. 727] In answer, expert witnesses for DuMont and

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[1]A foot lambert is the unit for measuring the brightness factor of light reflected from a surface. One foot lambert represents the brightness of one foot candle of illumination reflected from a perfectly reflecting surface.

other companies testified that in their opinion the brightness of the Columbia picture was not adequate for home use. Dr. Goldmark maintained that it was adequate and that any greater brightness would be uncomfortable to the eyes.

The demonstration was not an effective medium for resolving this conflict in testimony. The hearing room where the demonstrations took place was, of necessity, a large room and hence it was difficult to approximate home conditions. The distances and angles at which the pictures were viewed were such as would normally not be found in the average home. Moreover, the room had overhead lights suspended on chandeliers which caused annoying reflections from the face of the receiver. Such lights would usually not be found in a home. Reflections also were apparent from large windows on the side of the hearing room.

However, it should be pointed out that there was no evidence presented as to what the situation would be under home conditions. Indeed, since Columbia has not tested its sets in homes, such evidence was not available. The Commission is of the opinion that on a question as to just how much brightness is necessary for home viewing under normal ambient lighting conditions, there is no substitute for actual tests in homes under a wide variety of circumstances. It is not possible to theorize on what the public will find to be generally acceptable. Adequate tests must be made at numerous home receiving locations. In many homes, the space is so arranged that lights from windows or from lamps or overhead lights will, unavoidably, fall directly on the face of the receiver, being just as bad or worse than the conditions in the hearing room. Moreover, receivers will undoubtedly be placed in public places, such as auditoriums, hotel lobbies, etc. Tests should cover this type of situation as well as more ideal test situations. Until a sufficient number of tests has been made, the Commission is unable to conclude that the brightness of the Columbia picture is adequate for home use.

(2) *Flicker*—Equally as important and closely related to the problem of brightness is flicker. The presence of flicker on the television screen as on the motion picture screen is tiring on the eyes and is a serious obstacle to enjoyable viewing. In the case of television as in the case of motion pictures, an increase in brightness of the picture (without an increase in frame rate) accentuates observable flicker.

It is this factor which operates as a serious stumbling block in the path of increasing the brightness of the Columbia picture.

There is not agreement on the record as to whether there would be any flicker in the Columbia picture if a brightness of 20 foot lamberts is achieved. However, as the brightness is increased, and the frame rate remains constant, there would no doubt be an increased tendency to flicker. Columbia witnesses were in disagreement with the witnesses of other companies concerning the point at which such flicker becomes noticeable or objectionable. However, even if we [fol. 728] use the testimony of Columbia's own witnesses, flicker becomes apparent (i.e. "threshhold flicker") at 23 foot lamberts and begins to be objectionable (i.e. "maximum tolerable flicker") at 52 foot lamberts.[2] As has already been pointed out, on the basis of the evidence before the Commission, there is no real assurance that greater brightness is unnecessary for normal home viewing conditions.

Moreover, there are several factors concerning the tests upon which the Columbia testimony is based which severely minimize their value. In the first place, these tests were conducted with a relatively small group of persons. In addition, all of these persons were not only employees of Columbia but in addition were employed in the very department which has responsibility for the development of color television. Finally, even these tests showed that there was a great difference of opinion among individual observers as to what constituted perceptible flicker. The results given by Columbia are based on median values. The Commission is of the opinion that in a field where such subjective elements as "threshhold flicker" and maximum tolerable flicker" are being tested, there are no shortcuts. If the results of the tests are to be given any weight, they must be made with disinterested persons and a sufficient number must be chosen at random so that there is reasonable assurance that the results are satisfactory not merely to 50% of the people but to the great majority of viewers.

A second limiting factor applicable to the Columbia tests arises from the fact that they are based on a viewing ratio

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[2] As will be pointed out later, these figures are based on the use of so-called low flicker primaries.

of 7 to 1; that is, the observers were seated at a distance from the receiver that was seven times as much as the height of the picture. Other witnesses testified that the optimum viewing distance was 4 to 1. It is well known that the tendency to observe flicker increases as one draws closer to the receiver and decreases as one draws farther away. It is obvious that in many homes not all of the television viewers will be able to sit at a 7 to 1 distance from the receiver. In the case of a picture 10 inches high, a 7 to 1 ratio is 70 inches—which appears to be practicable for most living rooms. If a receiver were employed with a picture 18 inches high—as is true of some present day monochrome receivers—an observer would have to be 126 inches from the receiver—or 10½ feet. It is not reasonable to expect that living rooms will be arranged for the television set only; consideration in placing furniture in the home must also be given to livability and comfort. Many home owners will undoubtedly find it impossible to place their receiver in the best possible position for viewing. Since this is so, the Commission in setting standards for color television must make it possible for the system to be used in the average home and under normal circumstances.

[fol. 729] A third factor that should be mentioned relates to the particular color primaries used. It is possible to utilize several different combinations of values of the primary colors—red, green and blue—in color television. Originally Columbia used a set of color primaries which in the record is referred to as "Color Primaries B". At the present time, it is utilizing a set of primaries referred to as "Color Primaries A". There is no dispute on the record that Color Primaries B give a more faithful reproduction of colors than Color Primaries A. Columbia has decided to utilize Color Primaries A because these are the so-called low-flicker primaries. In other words, by utilizing Color Primaries A, it is possible to increase the brightness of pictures to a higher value without increasing the susceptibility to flicker.

An answer to this problem of brightness and flicker might be found in a higher frame rate; with a higher frame rate additional brightness is possible without flicker: The difficulty with this solution is that Columbia has specifically stated that it is opposed to a higher frame rate. Moreover, an increase in frame rate creates other problems which will be discussed in the next section.

Another possible solution was suggested by Dr. Goldmark. He testified that it was possible to increase brightness without changing the frame rate and still avoid flicker. This could be done, he stated, by employing tubes with a slow decay phosphor. Dr. Goldmark admitted that such tubes have not yet been developed. Moreover, R. C. A. testified that it had experimented with such tubes and had found them to be very complicated. Witnesses for DuMont testified that that company had also conducted experiments with tubes having slow decay phosphor but found them objectionable. Apparently such tubes resulted in objectionable trails being left on the face of the tube. It is not possible to resolve this dispute until tubes of the type described by Dr. Goldmark are in fact developed and are sufficiently field tested so that it can be stated with assurance that they will work satisfactorily.

In summary, the Commission is unable to conclude from the evidence that the brightness of the Columbia picture is adequate for home use under normal circumstances or that it can achieve such brightness without encountering objectionable flicker. In the absence of more convincing evidence on the point, the Commission is of the opinion that on the point of brightness and flicker alone, the risk of approving the Columbia standards at this time is that color television might be forced to limp along with a picture that is not sufficiently bright for general home use or is subject to objectional flicker.

[fol. 730] (3) *Frame rate.*[3]—As has been pointed out,

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[3] During the course of the hearing, the expression "frame rate" was used in several different meanings. Sometimes it meant the number of times per second that the picture area is scanned once in each of the three primary colors. This is more accurately described as "color frame frequency". At other times, "frame rate" was used in the same sense as in the motion picture industry. As so used it means the number of times per second that each individual picture is seen in all of the colors; this is the meaning that is employed in this Report. The difference between the two concepts arises from the fact that in television, as in the motion pictures, each picture is shown twice during the course of each frame. Hence, "frame rate" is half of the "color frame frequency". In monochrome television the frame rate is 30 per second.

frame rate is closely related to the problem of both brightness and flicker. In general, the higher the frame rate, the brighter the picture can be without flicker. On the other hand, the higher the frame rate the wider must be the television channel. Thus, an accommodation must be made between a high enough frame rate to give adequate brightness while at the same time not being so high as to involve the use of so wide a channel as would constitute the wasteful use of radio spectrum.

Until fairly recently, Columbia employed a frame rate of 20 per second. This was clearly inadequate as on Columbia's own testimony this would permit a picture brightness of only approximately 5 foot lamberts before flicker became noticeable and slightly more than 11 foot lamberts before the flicker became objectionable. Both of these figures are based on the use of the low flicker primaries A. In the instant petition Columbia has proposed a frame rate of 24 per second. While this increase permits a brighter picture than was possible with a frame rate of 20, there is considerable doubt, as has already been pointed out, as to whether the brightness which results is adequate.

Columbia's petition does not request an increase in frame rate beyond 24 per second. On the contrary, Columbia made it clear at the hearing that it did not desire any such increase. A further increase in frame rate is, of course, possible, but there are several objections to doing so under the Columbia system.

In the first place, an increase in frame rate would mean additional channel width. Since the Columbia proposal already requests a band width of 16 megacycles, any further widening of the band is to be avoided if at all possible. The wider the band, the fewer television channels that can be accommodated. With 16 megacycle channels, only 27 television channels can be provided for between 480 and 920 megacycles. There is some doubt as to whether this number is adequate to provide a truly nationwide competitive television system. Any diminution in the number of available channels will make the task even more difficult. Moreover, at the hearing in Princeton, R.C.A. demonstrated a simultaneous television system which employed a frame rate of 30 per second and yet could be accommodated within a 12.5 megacycle band. While this system is as yet too untested to be able to predict whether it will prove to be practicable, or whether it results in degrading television

[fol. 731]

performance, the combination of a higher frame rate with narrower band width which the system proposes is a development that is highly desirable and should be fully explored.

In the second place, an increase in frame rate poses some very difficult mechanical problems. The higher the frame rate, the faster must be the revolution of the mechanical color wheel. An increase in frame rate from 24 to 30 per second would require an equivalent increase in the speed of the color wheel from 1440 revolutions per minute to 1800 revolutions per minute.[4] If this increase is added to an increase in the size of the color wheel which is necessary to make possible larger direct-viewing screens, some very real mechanical and noise problems are introduced.

(4) *Color Breakup.*—One of the points which the opponents of the sequential color system make is that since the appearance of color is produced by a rapid alternation of the three primary colors, the color in the picture has a tendency to break up under certain circumstances. They suggest that a practical test for determining whether there is such breakup is to move the head vigorously from side to side while looking at the picture or to move the hand vigorously in front of the eyes while viewing the picture. Dr. Goldmark replied that it is not normal procedure for people in their homes to go through such antics in looking at a television picture.

The opponents, however, make the point that even without such antics, color breakup becomes apparent if a fast moving object is shown on the screen. During the demonstration in New York, the observers associated with those companies opposing the Columbia proposal stated that color breakup was apparent, while observers associated with Columbia stated that there was no color breakup. As has already been stated, the hearing room was not an effective place for proving or disproving this point. In the Commission's opinion, the question of whether there is or is not color breakup is a matter to be determined by the individual viewer and hence there is no substitute for testing the system in a representative number of homes under normal conditions where programs of a wide variety of subjects are presented over a fairly long period of time. Only in this

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[4] These figures are based upon the use of a color wheel containing two segments of each color primary.

way, can there be any assurance that the general public will or will not be able to observe color breakup.

[fol. 732] (5) *Receiver design.*—The inadequacy of field tests, in general, of the Columbia receivers has already been referred to. There are, however, several special matters concerning the need for tests of receivers that should be mentioned.

At the hearing Columbia demonstrated a receiver with a 7-inch direct viewing tube. A lens with magnifying characteristics was used in front of the tube so as to give an apparent size of a 10-inch screen. This lens, however, has since been discarded by Columbia because it is subject to specular reflection from lights and windows and severely restricts the viewing angle at which the picture can be seen.

It is obvious that color television will not be wholly satisfactory unless larger viewing screens can be built. At the present time there are 20-inch direct viewing tubes for monochrome television. Incorporating a viewing tube of that dimension into the Columbia color television system involves some difficult problems. With a 7-inch viewing tube the mechanical color wheel has a diameter of approximately 16 inches. For a 20-inch tube the diameter would be 42 inches. This would impose severe limitations on receiver cabinet design. Furthermore, as has already been pointed out, problems are involved in rotating such a disc at 1440 revolutions per minute without causing unpleasant noise. Even if the viewing tube were 15 inches, the rotating disc would have a diameter of 32 inches, which still presents many difficult problems.

At the hearing, Dr. Goldmark testified that the color wheel was not an integral part of the sequential system. In his opinion, color can be produced under a sequential system by employing three different tubes each one coated with a special slow decay phosphor that is sensitive to only one of the three primary colors. The difficulty with the use of such tubes has already been adverted to. In the first place, no such system has yet been built or field tested. Secondly, witnesses for DuMont testified that that company had made tests with slow decay phosphor tubes but had found them objectionable. Unless or until a system which has the 3-tube system is constructed and field tested, there is no assurance that it will work successfully. The Commission, therefore, cannot assume with any degree of assurance that the

Columbia system is not limited to the color wheel with the severe restrictions it imposes on picture size in a direct viewing receiver.

Larger pictures, of course, can be produced by means of a projection receiver. On this point, Columbia testified that it had built such receivers in the past but at the present time had no such set available. Moreover, it is well known that projection receivers are incapable of producing as bright a picture as a direct view receiver and reference has already been made to the serious doubts concerning the adequacy of the brightness of the Columbia direct view receiver. In the case of the projection receiver this problem would be aggravated.

[fol. 733] The conclusion is inescapable that further field testing of receivers is indispensable before standards can be approved.

(6) *Design of other equipment.*—No transmitter has yet been built which will operate in the upper part of the 480 to 920 megacycle band. Receiving antennas of fairly complex design have been built and tried out to some degree; apparently, the standard form of antenna will not be adequate for good reception in this band. Additional tests of the antennas should therefore be made.

So far as studio and pickup equipment is concerned, Columbia stated that it has built an image orthicon camera and has pointed it out the window for outdoor pickups. It should be noted that no attempt was made to demonstrate this equipment at the hearing. Moreover, Columbia admitted that it has not used this equipment to televise sporting events or any outdoor special events.

III

In addition to the question of field testing, the Commission is of the view that further experimentation is necessary in the color television field. From a consideration of the Columbia petition and the evidence adduced at the hearing it is evident that the Columbia system is in effect the present monochrome television system with color added. While the present system affords an adequate black and white service to the public, the fact remains that it was developed and standardized before the extensive developments in electronics that took place during the war. It is quite possible that as a result of wartime discoveries, improvements

can be made, for example, in picture detail, picture sharpness, a simpler and more-effective synchronization system, a better sound system, etc. Furthermore, wartime developments may show that there is an entirely different method from either the sequential or simultaneous system which is superior to both. Before standardizing television in the upper band, we should be sure that all of the wartime electronic developments have been explored to determine whether they can be applied to the advantage of television. The wartime security precautions have been lifted so recently that much of the vital information developed during the war probably has not seeped down to all elements of the industry working on television problems. The effect of these wartime developments cannot be fully felt until there has been this widespread dissemination of information.

Two specific problems, in the Commission's opinion, should be carefully examined. In the first place, there should be further experimentation looking towards the development of low cost television receivers. A large portion of the radio spectrum has been allocated for television, [fol. 734] The demand for space in the spectrum from other radio services is very keen and it is not possible to satisfy all requests. The objective of television heretofore mentioned of bringing news, education, culture and entertainment to large numbers of people cannot be carried out unless television receivers are manufactured and sold at a price which the average family can afford to pay.

Secondly, further experimentation should be conducted along the line of finding methods of transmitting color television over narrower channels. Under the Columbia proposals, each television channel would be 16 megacycles wide. That means that the band 480 to 920 megacycles would accommodate but 27 channels. It was the Commission's hope in allocating the band 480 to 920 megacycles for television that in this band it would be possible to provide for a truly nationwide competitive television system. The evidence before the Commission shows that 27 channels may not ultimately be enough to provide for a truly nationwide competitive television system. Every effort must, therefore, be made to narrow the band width required for color television. It should be emphasized that narrowing the band width should not be at the expense of picture brightness, picture detail, color fidelity, or other features

of television performance. The objective should be a narrower band width while retaining and even improving the quality of television performance.

At the hearing there was much testimony concerning the desirability of a system which would permit present television receivers, simply by adding a convertor, to receive in monochrome, the broadcasts of stations broadcasting color programs in the 480 to 920 megacycle band. This so-called principle of compatibility, it is urged, will encourage manufacturers of black and white equipment to proceed at full pace, will enable the public to buy receivers with confidence that they will not be rendered obsolete, and will not impede the development of color television. The Commission is of the opinion that compatibility is an element to be considered, but that of greater importance, if a choice must be made, is the development of the best possible system, employing the narrowest possible band width, and which makes possible receivers capable of good performance at a reasonable price.

[fol. 735] IV

The Commission is of the opinion for the reasons Broadcasting System should be denied. In reaching this decision, the Commission does not desire to minimize in any way the advances that have been made in the development of color television. On the contrary, the Commission is of the opinion that Columbia Broadcasting System, Dr. Goldmark and the people who have worked under him are to be commended for their continuing interest in the field and for the great strides that they have made in this field in so short a period. The Commission, however, cannot escape the conclusion that many of the fundamentals of a color television system have not been adequately field tested and that need exists for further experimentation along the lines noted above. It is hoped that all persons with a true interest in the future of color television will continue their experimentation in this field in the hope that a satisfactory system can be developed and demonstrated at the earliest possible date.

[fol. 736] EXHIBIT "E" TO INTERVENING COMPLAINT

Tel.: Stilwell 4-3036-7, Stillwell 4-5455-6-7-8. Cable Address, Pilotradio, New York.

PILOT RADIO CORPORATION

Manufacturers of Radio and Television Apparatus

37-06 Thirty-Sixth Street,
Long Island City 1, New York, U.S.A.

September 27th, 1950.

Federal Communications Commission, Washington, D. C.

GENTLEMEN:

Pilot Radio Corporation is a manufacturer of television receivers and as such is vitally interested in and affected by your report on color television issues, adopted September 1, 1950, and your concurrently issued notice of proposed rule making. Accordingly, and in response to the invitation extended therein to television manufacturers, we are herewith submitting our views and comments.

At the outset, we must point out that it is physically impossible to build sets capable of operating within the proposed brackets, commencing with the effective date of the adoption of the proposed order, i.e., some time in November, 1950, as requested by you. This was the unanimous view of the engineering representatives of the television industry expressed at a meeting of Panel 5 of the NTSC held on September 13, 1950. Estimates there presented of the earliest date on which such sets could be built ranged from April 1951 to February 1952. For that reason alone, we cannot give you the assurance you ask. In addition, we find your proposal unacceptable for a variety of other pertinent considerations.

Your proposal regarding bracket standards is inextricably tied in with your determination on the CBS color system. Recognizing, as you must, that you lack the power to regulate or control the manufacture of television receivers, you have made no separate and independent demand upon the industry to incorporate the proposed bracket standards in television receivers. The demand is, ostensibly presented as an alternative. You seek thereby to accomplish indirectly what you cannot do directly. Thus

you threaten that unless we comply with your "request", you will immediately approve a color system, viz, that of CBS, which is not yet ready for commercialization and which you yourself have admitted is far from satisfactory and therefore unacceptable to television manufacturers. If we accede to your demand, you offer us an illusory reward: you will postpone your decision as to color to afford time to explore the matter more fully. We say "illusory" because, as we shall hereinafter discuss, the time which you propose to allot for further demonstration and development is wholly inadequate even when judged by your own criteria.

[fol. 737] This is a choice without real alternative, and is bound to cause incalculable harm to the general public as well as to the large and growing television industry. You are asking manufacturers to spend substantial amounts of money and effort in putting additional apparatus in television sets, which will necessarily result in increased costs to the public, even though the same is not intended for present use and will ultimately be discarded, if, as a result of the postponement of a decision on color, a system different from CBS is adopted. If the industry fails to provide the assurances required by you—as it must if for no other reason than the time limit alone—then, as a penalty for its noncompliance, you plan immediately to adopt a system which you do not otherwise find adequate for present approval. Every television manufacturer thereupon will be required to commence the manufacture of sets capable of receiving under the CBS system in order to meet the public demand for color which will follow your decision. Existing sets, including those already produced and unsold and in the process of manufacture, will be outmoded, as, obviously the public will insist upon sets embracing the new standards. The entire revamping of our industry will thus be necessitated by your action. The public will, of course, assume by your approval that the CBS color system is an effective and desirable one. Proof to the contrary, after the public has invested money in the actual purchase of receivers, can only result in a loss of faith in television and a serious retardation in the industry.

In view of the great importance of your decision, it should at least rest on firm foundations. An analysis of your report establishes, however, that your proposals are predicated on the ephemeral hope that further experimenta-

tion and possible improvements may subsequently justify your present decision. The keystone of your report is "speculation and hope".

In evaluating the several proposed color systems submitted to you, you considered a number of pertinent factors such as flicker, brightness, contrast, resolution, etc. With respect to practically each one of those factors, you concluded that more information was needed. The following comments from your report are pertinent: (All numbers in parentheses refer to paragraphs in your report.)

> With respect to the potentialities for improvement so far as flicker is concerned you stated that you were anxious to see further testing conducted with long persistence phospors (60). As to the CBS color system: ". . . . If tubes with long persistence phosphors were utilized, it would be possible to increase brightness several fold with no flicker problem. . . . but it is not possible to predict the extent of such improvement without further testing. It should be noted, however, that there is a limitation on the use of very long persistence phosphors with a disc type receiver". (66)

> [fol. 738] As to color breakup and color fringing: "Color breakup and color fringing were observed at the demonstrations on the disc receivers. The use of tubes with long persistence phosphors should minimize color breakup at the receiver. Color fringing, moreover, will still occur due to the use of the color disc at the camera." (82)

> As to brightness-contrast: " . . . Tubes with long persistence phosphors cannot be utilized on disc receivers without a problem of color contamination. . ." (75)

> As to the resolution factor: ". . . There is a reduction in vertical resolution by 23% and horizontal resolution by 46% as compared with the present system. By utilizing horizontal interlace and retaining the horizontal scaning rate suggested by CBS, the vertical resolution would still be reduced by 23% but the horizontal resolution would be approximately the same as monochrome. Further testing is required in order to determine whether this increase can be achieved in practice." (90)

> As to picture texture: ". . . As above stated, the geometrical resolution of the CBS picture was inferior to a picture under the present standards. . . ." (94)
>
> "If horizontal interlace were utilized on the CBS system, the picture texture could be affected thereby. Dot structure or twinkle could appear in the picture. CBS testified that this could be avoided in its system utilizing horizontal interlace. Satisfactory proof of this point requires further testing." (96)

Over and above the foregoing essentials, which require further testing and additional information, you recognized a most fundamental inherent deficiency in the present CBS system. The CBS system is, as a practical matter, limited to receivers of no greater size than 12½ inches. In line with this fact, the estimate computed by you as the cost of adaptation and conversion, namely $125 to $170, is predicated upon tubes no larger than 12½ inches. The tendency in direct view receivers, however, is, as you correctly state, to tube sizes larger than 12½ inches. The public is buying and demanding almost exclusively receivers of more than 12½ inches in size. Thus, even if the CBS system were a fully developed, effective system, as clearly from your own statements it is not, such system is not usable on the vast majority of sets being manufactured and sold. Here again, however, you depend on mere hope and speculation in developments to come. Thus you state that though the tri-color tube may, if sufficiently developed, be utilized in the field sequential system, such a tube has not yet been devised and successfully demonstrated. In your own words [fol. 739] "there is no demonstration on record of a direct view tri-color tube on the CBS system" and "the record does not contain a definitive answer as to whether direct-view tubes larger than 12½ inches are possible with the CBS system". The core of your action is contained in your reasoning on this very vital matter. We quote:

> "Thus two difficult courses of action are open to the Commission. The first course of action is to reopen the record and to have a demonstration on the record wherein a tri-color tube or other technique for displaying large size direct-view pictures could be tried out on the CBS system. The second course of action is to adopt a final decision now promulgating color

standards on the basis of the CBS system with the confidence that since the radio industry has succeeded in creating much larger tube sizes than those demonstrated in 1941 when standards for black and white television were adopted, they would succeed in building apparatus that would eliminate the present limitation in the CBS system as to size of direct view tube." (145)

"The advantage of the first course of action is that the Commission would not be compelled to speculate as to an important basis for its decision but would have a definitive answer on the basis of which to act. . . . The advantage of the second course of action is that it would bring a speedy conclusion to the matters in issue and would furnish to manufacturers a real incentive to build a successful tri-color tube as soon as possible. . . . The disadvantage is that the Commission's determination on an important part of its decision would be based on speculation and hope rather than on demonstrations." (146)

By your own statement, you have decided "to speculate as to an important basis for (your) decision." To predicate changes in the industry of such tremendous magnitude upon "speculation and hope" is, we submit, unsound and improper. It flies, moreover, in the face of your heretofore announced policy:

"Before approving proposed standards, the Commission must be satisfied not only that the system proposed will work but also that the system is as good as can be expected within any reasonable time in the forseeable future. In addition, the system should be capable of permitting incorporation of better performance characteristics without requiring a change in fundamental standards. Otherwise, the danger exists that the standards will be set before fundamental developments have been made with the result that the public would be saddled with an inferior service, if the new changes were not adopted, of if they were adopted, receivers already in the hands of the public would be rendered useless." (18)

[fol. 740] The approval of the CBS system constitutes a present change in fundamental standards without satis-

factory proof that said system is as good as can be expected within the forseeable near future. Further improvement and knowledge of such significant developments as direct view tri-color tubes, long persistence phosphors, and horizontal interlace, to mention a few significant items recognized by you, may require still further changes in fundamental standards. Why then adopt the CBS color system now? Why, if, as you concede, more information is needed with respect to the mentioned developments, don't you afford the requisite time therefor? The failure of the industry to incorporate the proposed bracket standards in its sets—impossible within the time limit prescribed, and wasteful and unnecessary if the CBS system as presently constituted is not finally adopted—is not a justifiable basis for precluding such time for important development. If further time is needed, it is needed regard ess of what the industry does with respect to the proposed bracket standards.

Even if the industry gave you the requested assurances there is no evidence of your sincerity in proposing to postpone a decision ostensibly to seek a better system. Heretofore, you required adequate field testing as the basis for adopting any system and pointed out that:

> "Receivers and transmitters must be subject to numerous tests over a long period of time and at a diversified set of locations and operating conditions so that operation under average home conditions is closely approximated. Without such field testing, there is no assurance that all fundamental defects have been eliminated. There is a great difference between the performance of a system in a laboratory with trained personnel and its operation in the home by the average citizen. In the history of electronics there have been developments which looked promising in theory, and even in operation in the laboratory but which revealed such fundamental defects when subjected to adequate field testing that they had to be abandoned entirely." (138)

[fol. 741] In that connection you have recognized that a minimum time for field testing is 6 months. (8) In the light of the long time that the CBS system has been under consideration (as far back as August 1940 a CBS system

was demonstrated) the time which you propose to allow for demonstration of other systems—December 5th, 1950 to January 5th, 1951,—which embraces Christmas and New Year, seems to be no more than a "holiday weekend". This is wholly inadequate. You are thereby closing the door to significant developments even though there are already, according to your report, improvements with practical, usable, and even revolutionary possibilities, such as the tri-color tube, horizontal interlace and long persistence phosphors, all of which require further testing. These are vital and significant matters which cannot justifiably be foreclosed by the Commission. In addition, there is, as the Commission recognizes "great activity in the color field and . . . since fundamental research cannot be performed on schedule, it is possible that much of the fruit of the research is only now beginning to emerge" and new color systems and improvements in existing color systems are distinct possibilities. (148)

Commissioner Hennock summarizes the immense potentialities and the need for additional time to develop and test the same. She states:

> " . . . Still, the improvement which took place during the course of the hearings, a relatively short time when compared to the previous course of television development, was impressive. There are many indications that intense effort is being exerted to overcome the difficulties inherent in compatible color systems. Off-the-record developments by Hazeltine, General Electric, Color Television, Inc., and RCA may be bringing us a little closer, if not near, to the realization of a practical compatible color system. In any event we should work toward that end with all our energy until the last possible moment, and not foreclose the possibility of its achievement until convinced that it is a practical impossibility. . . "

Pilot Radio Corporation is heartily in favor of color television. But why the precipitate haste in adopting the CBS system? The only possible justification which you advance for now adopting, on "hope and speculation", the CBS system, is the fact that there are presently about seven million television sets in the hands of the public not capable of receiving a black and white picture from CBS color

transmission, similar sets are rapidly being produced, and further delay, in your opinion, would aggravate the compatibility problem. The conclusive answer to your fears [fol. 742-743] has been given by your Chairman. Addressing the National Electronics Conference, after the publication of your report, Mr. Coy stated that the cost of placing brackets in future sets would be "of approximately the same order" as the cost involved in adapting outstanding receivers. It is apparent, therefore, that increased costs will not be incurred as a result of deferring a decision on color. The so-called problem of incompatability, accordingly, is an absolutely untenable basis for disrupting the television industry and subjecting it and the public to tremendous expense at this time in connection with a system which is supported by "hope and speculation" and which, in view of new developments, may soon be proven to be inferior and undesirable.

The nation has already been called upon to devote its maximum efforts to military preparation. Statutory authority for material controls and allocation has already been enacted and executive implementation partly put into effect. Retrenchment and conserved utilization of vital materials in the television industry would appear shortly inevitable. Under such circumstances, to require at this time a revamping of our industry and its facilities would be impracticable and heedlessly wasteful. Commercialization of a still unproven system, which may in a reasonable time be rendered archaic by already indicated improvements, seems neither wise nor lawful. We are, therefore, constrained to voice our definite opposition to your proposals.

Very truly yours,

Pilot Radio Corporation. By Isidor Goldberg, Pres.

[fol. 744] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

NOTICE—Filed October 30, 1950

Please Take Notice, that on October 30, 1950, at the opening of Court in the forenoon of that day, or as soon thereafter as counsel can be heard, the undersigned will appear before the Honorable Philip L. Sullivan, Judge of the

aforesaid Court, in the courtroom usually occupied by him in the United States Court House, Chicago, Illinois, and shall present to the Court the attached written motion for an order granting Columbia Broadcasting System, Inc., leave to intervene as a defendant in the above-entitled proceeding.

Dated: October 27, 1950.

Arvey, Hodes and Mantynband,
by George L. Siegel, a Member of the Firm, Attorneys for Columbia Broadcasting System, Inc.,
1 North La Salle Street, Chicago, Illinois.

[fol. 745] Of counsel:

Rosenman, Goldmark, Colin & Kaye,
by —— Goldmark, 165 Broadway, New York, N. Y.

To: Weymouth Kirkland, Esq., and Kirkland, Fleming, Green, Martin & Ellis, Esqs., Attorneys for Radio Corporation of America, National Broadcasting Company, Inc., and RCA-Victor Distributing Corporation, 33 North La Salle Street, Chicago, Illinois.

Cahill, Gordon, Zachry & Reindel, Esqs. Of counsel to Radio Corporation of America, National Broadcasting Company, Inc., and RCA-Victor Distributing Corporation, 63 Wall Street, New York, N. Y.

Hon. J. Howard McGrath, Attorney General of the United States, Washington, D. C.

Otto Kerner, Jr., Esq., United States Attorney for the Northern District of Illinois, Chicago, Illinois.

Benedict P. Cottone, Esq., General Counsel, Federal Communications Commission, Washington, D. C.

[fol. 746] In The United States District Court
[Title omitted]

Motion to Intervene as a Defendant—Filed October 30, 1950

Columbia Broadcasting System, Inc., moves for leave to intervene in the above-entitled action, in order to assert and support the validity of the order of the Federal Communications Commission attacked in the action herein, on the

ground that it was a party in interest to and participated fully in the proceedings before the Federal Communications Commission, entitled:

"In the Matters of
Docket Nos. 8736 and 8975

Amendment of Section 3.606 of the Commission's Rules and Regulations.

Docket No. 9175

Amendment of the Commission's Rules, Regulations and Engineering Standards Concerning the Television Broadcast Service.

Docket No. 8976

Utilization of Frequencies in the Band 470 to 890 Mcs. for Television Broadcasting," and that its intervention is of right, pursuant to the provisions of Section 402(a) of the Communications Act of 1934, as amended (47 U.S.C. [fol. 747] Section 402(a)), and of Title 28 U.S.C. Section 2323.

Dated: October 27, 1950.

Arvey, Hodes and Mantynband,
by George L. Siegel, Attorneys for Columbia Broadcasting System, Inc., 1 North La Salle Street, Chicago, Illinois.

Of counsel:

Rosenman, Goldmark, Colin & Kaye,
by Walter ——, 165 Broadway, New York, N. Y.

[fol. 748] In The United States District Court

[Title omitted]

Affidavit of Adrian Murphy—Filed October 30, 1950

State of New York
County of New York, SS:

Adrian Murphy, being duly sworn, deposes and says as follows:

1. I am a senior vice-president and general executive of the Columbia Broadcasting System, Inc., (hereinafter

referred to as CBS) 485 Madison Avenue, New York, New York. I have, and since 1940 (except for the years 1942-1945 when I was in the military service) have had, general supervisory responsibilities over the activities of CBS in the field of color television. I make this affidavit in support of the motion of CBS to intervene in the above-captioned case.

2. CBS is engaged in the business of sound and television broadcasting and in sound and television network broadcasting. The only manufacturing activity of CBS is through it wholly-owned subsidiary, Columbia Records, Inc., which manufactures phonograph records. CBS is not engaged in the manufacture of television receivers, transmitters, cameras, or other television equipment.

[fol. 749] 3. Since 1940, CBS has engaged in the development of a system, known as the field sequential system, of broadcasting television in color. CBS has expended in excess of $4,000,000 in the course of such development. Since commercial broadcasting of color (as in the case of any other kind of sound or television broadcasting) is not permissible until technical engineering standards therefor have been adopted by the Federal Communications Commission (hereinafter referred to as the FCC), CBS has not yet been able to enjoy any revenue from broadcasting the color television system developed by it.

4. CBS was a party to the hearing before the FCC and was the proponent of the field sequential system, standards for which were adopted by the order attacked by plaintiffs in this case. CBS participated fully in such hearing, submitting extensive evidence, comments and proposed findings and conclusions.

5. CBS owns a number of patents, and has applied for a number of additional patents (which patents issued and applied for are more fully described in Exhibit 402 of the record attached to defendants' motions) essential to the manufacture of transmitting and receiving equipment under the field sequential color system. CBS will license, and is licensing, all responsible manufacturers to use such patents at a reasonable fee. As a result of such licensing, CBS expects to receive substantial revenues of many millions of dollars in view of the adoption of standards by the FCC for the field sequential system. If the order of the FCC adopting such standards is set aside and annulled, CBS will be deprived of such revenues.

6. Commercially successful television networking operations depend in large measure on "circulation"—that is, the number of receivers in the hands of the public—and upon the effectiveness of the broadcast as an advertising medium. CBS has developed its method of color television, [fol. 750] adopted by the FCC, in the conviction that color will increase the demand of the public for television receivers and will prove a more effective medium, both in terms of circulation and impact, for advertisers than black and white broadcasts. Accordingly, CBS has completed plans to begin the regular commercial broadcasting of color under the order adopted by the FCC. Such broadcasting is to begin on November 20, 1950, the effective date of the FCC's order, and, within a few weeks thereafter, the CBS color schedule will reach 20 hours a week. A number of advertisers have expressed interest in sponsoring and paying CBS for some of such broadcasts and it is expected the CBS will, by on or about November 20, 1950, complete contracts for such sponsorship. If the FCC order is set aside or annulled, anticipated revenues from sponsors of color broadcasts will also be denied CBS.

Adrian Murphy.

Sworn to before me this 27 day of October, 1950. Emily M. Green, Notary Public, State of New York, No. 31-6638100. Qualified in New York County. Certs. filed with N. Y. Co. Clk. & Reg. Commission expires March 30, 1952. (Seal.)

[fol. 751] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

STIPULATION—Filed October 30, 1950

It is hereby stipulated and agreed by and between the attorneys for the respective parties hereto:

That the plaintiffs hereby consent to the appearance as of right in the above-entitled proceedings of Columbia Broadcasting System, Inc., (which was a party in interest

to the proceedings before the Federal Communications Commission, entitled:

"In the Matters of
Docket Nos. 8736 and 8975

Amendment of Section 3.606 of the Commission's Rules and Regulations.

Docket No. 9175

Amendment of the Commission's Rules, Regulations and Engineering Standards Concerning the Television Broadcast Service.

Docket No. 8976)

Utilization of Frequencies in the Band 470 to 890 Mcs. for Television Broadcasting"

pursuant to the provisions of Section 402(a) of the Communications Act of 1934, as amended (47 U.S.C. Section [fol. 752] 402(a)), and of Title 28 U.S.C. Section 2323, and an order may be entered upon this stipulation without notice to the parties herein.

Dated: October 28, 1950.

Weymouth Kirkland, by Weymouth Kirkland, Kirkland, Fleming, Green, Martin and Ellis, by Weymouth Kirkland, Attorneys for Radio Corporation of America, National Broadcasting Company, Inc. and RCA-Victor Distributing Corporation.

Cahill, Gordon, Zachry & Reindel, by John W. Childs, of counsel to Radio Corporation of America, National Broadcasting Company, Inc. and RCA-Victor Distributing Corporation.

Attorney General of the United States, by John F. Baecher.

United States Attorney for the Northern District of Illinois, by Anthony Scariano.

Federal Communications Commission, by Max Goldman.

[fol. 753] Received copies of the foregoing Notice and the foregoing Motion to Intervene as a Defendant.

Weymouth Kirkland, Esq., and Kirkland, Fleming, Green, Martin & Ellis, Esqs., Attorneys for Radio Corporation of America, National Broadcasting Company, Inc. and RCA-Victor Distributing Corporation, by Weymouth Kirkland.

Honorable J. Howard McGrath, Attorney General of the United States, by John F. Baecher.

Otto Kerner, Jr., Esq., United States Attorney for the Northern District of Illinois, by Anthony Scariano.

Benedict P. Cottone, Esq., General Counsel, Federal Communications Commission; by Max Goldman.

Dated: October 30th, 1950.

[fol. 753a-754] [File endorsement omitted.]

[fol. 755] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

NOTICE—Filed October 30, 1950

Please Take Notice, that on the 14th day of November, 1950, at the opening of Court in the forenoon of that day, or as soon thereafter as counsel can be heard, the undersigned will appear before the Honorable Philip L. Sullivan, Judge of the aforesaid Court, and such other judges as may constitute the statutory three-judge court, convened or to be convened in the above-entitled action, and shall, upon the complaint in this action, and upon all the other papers and proceedings heretofore or coincidentally filed and had herein, present to the Court written motions to dismiss the complaint or, in the alternative, for summary judgment.

Dated: October 27, 1950.

Arvey, Hodes and Mantynband, by George L. Siegel, A Member of the Firm, Attorneys for Columbia Broadcasting System, Inc., 1 North La Salle Street, Chicago, Illinois.

[fol. 756] Of Counsel:

Rosenman, Goldmark, Colin & Kaye, by ——, Goldmark, A Member of the Firm, 165 Broadway, New York, N. Y.

To:

Weymouth Kirkland, Esq., and Kirkland, Fleming, Green, Martin & Ellis, Esqs., Attorneys for Radio Corporation of America, National Broadcasting Company, Inc. and RCA-Victor Distributing Corporation, 33 North La Salle Street, Chicago, Illinois.

Cahill, Gordon, Zachry & Reindel, Of counsel to Radio Corporation of America, National Broadcasting Company, Inc. and RCA-Victor Distributing Corporation, 63 Wall Street, New York, N. Y.

Hon. J. Howard McGrath, Attorney General of the United States, Washington, D. C.

Otto Kerner, Jr., Esq., United States Attorney for the Northern District of Illinois, Chicago, Illinois.

Benedict P. Cottone, Esq., General Counsel, Federal Communications Commission, Washington, D. C.

[fol. 757] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

MOTION TO DISMISS THE COMPLAINT OR, IN THE ALTERNATIVE, FOR SUMMARY JUDGMENT—Filed October 30, 1950

Upon the complaint herein, and the exhibits annexed thereto; and upon all the other papers and proceedings heretofore or coincidentally filed and had herein, including the record comprising the notices, hearings, demonstrations, petitions, reports, opinions, and orders of the Federal Communications Commission in the proceedings entitled:

"In the Matters of
Docket Nos. 8736 and 8975

Amendment of Section 3.606 of the Commission's Rules and Regulations.

Docket No. 9175

Amendment of the Commission's Rules, Regulations and Engineering Standards Concerning the Television Broadcast Service.

Docket No. 8976

Utilization of Frequencies in the Band 470 to 890 Mcs. for Television Broadcasting."

the intervenor-defendant Columbia Broadcasting System, [fol. 758] Inc., in the above-entitled action moves this Court to dismiss the complaint or, in the alternative, for summary judgment in its favor.

The grounds of the motion to dismiss the complaint are:

1. With respect to plaintiffs Radio Corporation of America, National Broadcasting Company, Inc., and RCA-Victor Distributing Corporation, the complaint fails to state a claim upon which relief can be granted.

2. With respect to plaintiffs National Broadcasting Company, Inc., and RCA-Victor Distributing Corporation, the Court lacks jurisdiction of the subject matter of the claims asserted by the aforesaid two plaintiffs. Neither of these

plaintiffs has standing to bring this action, and therefore no justiciable controversy is presented by their complaint.

The grounds of the motion for summary judgment, with respect to each of these plaintiffs, are:

Even if the Court have jurisdiction of the subject matter of this action as to all plaintiffs, the complaint and the exhibits attached thereto, and all the other exhibits, papers and proceedings heretofore or coincidentally filed and had herein, show that there is no genuine issue as to any mate-
[fol. 759] rial fact and that defendant-intervenor Columbia Broadcasting System, Inc., is entitled to judgment as a matter of law.

Dated: October 27, 1950.

Arvey, Hodes and Mantynband, by George L. Siegel, A Member of the Firm, Attorneys for Columbia Broadcasting System, Inc., 1 North La Salle Street, Chicago, Illinois.

Of counsel: Rosenman, Goldmark, Colin & Kaye, by —— Goldmark, a Member of the Firm, 165 Broadway, New York 6, N. Y.

[fol. 760] Received copies of the foregoing Notice and the foregoing Motion to Dismiss the Complaint or in the alternative for Summary Judgment this 30th day of October, 1950.

Weymouth Kirkland, Esq., and Kirkland, Fleming, Green, Martin & Ellis, Esqs.,
Attorneys for Radio Corporation of America, National Broadcasting Company, Inc., and RCA-Victor Distributing Corporation,
by Weymouth Kirkland.

Honorable J. Howard McGrath,
Attorney General of the United States,
by John F. Baecher.

Otto Kerner, Jr., Esq.,
United States Attorney for the Northern District of Illinois,
by Anthony Scariano.

Benedict P. Cottone, Esq.,
General Counsel, Federal Communications Commission,
by Max Goldman.

[fols. 760a-761] [File endorsement omitted.]

[fol. 762] IN THE UNITED STATES DISTRICT COURT

NOTICE—Filed November 10, 1950

The Honorable John Howard McGrath, Attorney General of the United States of America, Department of Justice, Washington, D. C.

Federal Communications Commission, Washington, D. C.

Honorable Otto Kerner, Jr., United States Attorney for the Northern District of Illinois, U.S. Court House, Chicago, Illinois.

Mr. Weymouth Kirkland and Kirkland, Fleming, Green, Martin & Ellis, Attorneys for Plaintiffs, 33 N. La Salle Street, Chicago, Illinois.

Schapiro and Schiff, Attorneys for Pilot Radio Corporation, 38 S. Dearborn Street, Chicago, Illinois.

Arvey, Hodes and Mantynband, Attorneys for Columbia Broadcasting System, Inc., 1 N. La Salle Street, Chicago, Illinois.

Please take notice that on Friday, the 10th day of November, 1950, at the hour of 10:00 o'clock in the forenoon, or as soon thereafter as counsel may be heard, we shall appear before the Honorable Philip L. Sullivan, United States District Judge, at his Courtroom in the United States Court House, 225 S. Clark Street, Chicago, Illinois, or before such [fol. 763] other judge of said court as may be hearing matters in his place and stead and shall at said time and place present the motion of Wells-Gardner & Co., an Illinois corporation, to intervene as a Plaintiff in the above entitled cause, a copy of said motion together with a copy of the proposed complaint of Wells-Gardner & Co., an Illinois corporation, being herewith served upon you, and shall move for the entry of an order granting said motion to intervene and ruling upon the parties in interest, to plead to the complaint of said Wells-Gardner & Co., an Illinois corporation.

At which time and place you may appear if you so see fit.

Righeimer and Righeimer, Attorneys for Applicant for Intervention, Wells-Gardner & Co.

Righeimer and Righeimer, 135 S. La Salle Street, Chicago, Illinois.

[fol. 764] State of Illinois,
County of Cook, ss:

Dora Judge, being first duly sworn, on oath deposes and says that she served the foregoing notice on The Honorable John Howard McGrath, Attorney General of the United States of America, Federal Communications Commission, Honorable Otto Kerner, Jr., United States Attorney for the Northern District of Illinois, Mr. Weymouth Kirkland and Kirkland, Fleming, Green, Martin & Ellis, Attorneys for Plaintiffs, Schapiro and Schiff, Attorneys for Pilot Radio Corporation, and Arvey, Hodes and Mantynband, Attorneys for Columbia Broadcasting System, Inc., by placing a copy of said notice in stamped, sealed envelopes, properly addressed to the above named, and by depositing said envelopes in the United States mail chute at 135 S. La Salle Street, Chicago, Illinois, postage prepaid, at 5:00 P. M. on the 3rd day of November, 1950.

Dora Judge.

Subscribed and Sworn to before me this 3rd day of November, 1950. Virginia A. Leonard.
[Seal.]

[fol. 765] In the United States District Court,

[Title omitted]

Motion to Intervene as a Plaintiff—Filed November 10, 1950

To the Judges of the District Court of the United States, for the Northern District of Illinois, Eastern Division:

Wells-Gardner & Co., an Illinois corporation, moves to intervene as a plaintiff in the above entitled cause on the following grounds:

1. Applicant is a corporation engaged in the manufacture of television receivers with its principal place of business in Chicago, Illinois.

2. The above entitled cause was commenced in this court by the filing of a complaint on October 17, 1950.

3. Said complaint seeks to have a certain order of the Federal Communications Commission approving the CBS color television system declared null and void and the promulgation, operation and execution thereof restrained and enjoined.

[fol. 766] 4. Applicant is interested in the above entitled action in that it has been adversely affected by said order of the Federal Communications System and has suffered and will continue to suffer damage as a result thereof unless said order is enjoined and set aside, all as more fully set forth in applicant's proposed complaint herein, a copy of which is attached hereto.

5. Applicant has the right, conferred by statute of the United States, to intervene in this action; see Communications Act of 1934 as amended (48 Stat. 1064, 1093, 63 Stat. 108; 47 U. S. C. Section 402 (a)) and the provisions of Title 28 of the United States Code (28 U. S. C., Sections 2321 to 2325, inclusive).

6. That Wells-Gardner & Co., is inadequately represented in the present proceedings and that it may be bound by a judgment in these proceedings.

7. In the alternative applicant submits that the conditional right conferred upon it by 63 Stat. 108; Title 28 U. S. C. Section 2323 should be recognized and affirmed by this court inasmuch as Wells-Gardner & Co. was and is a corporation interested in the question before the Federal Communications System which is the subject of this complaint heretofore filed in this cause; and inasmuch as applicant's claim and the main action have a question of law and fact in common; and inasmuch as the intervention of applicant will not delay or prejudice adjudication of the rights of the original parties to this action.

Wells-Gardner & Co., by Robert S. Alexander, President.

Righeimer and Righeimer, Attorneys for Applicant for Intervention, 35 S. La Salle Street, Chicago, Illinois.

[fol. 767] *Duly sworn to by Robert S. Alexander. Jurat omitted in printing.*

[fols. 767a-768] [File endorsement omitted]

[fol. 769] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

INTERVENING COMPLAINT—Filed November 14, 1950

Wells-Gardner & Co., an Illinois Corporation, leave of Court first had and obtained, intervenes in the above entitled cause and for its complaint herein alleges:

1. It brings its action pursuant to the provisions of the Communications Act of 1934, as amended (48 Stat. 1064, 1093 and 63 Stat. 108; 47 U. S. C. Section 402 (a)) and of Title 28 United States Code (28 U. S. C. Sections 1336, 1398, 2284, 2321-25) and Section 10 of the Administrative Procedure Act (60 Stat. 243; 5 U. S. C. Section 1009), to enjoin set aside, annul and suspend an order of the Federal Communications Commission (hereinafter called the "Commission") adopted October 10, 1950 in proceedings entitled "In the Matters of Amendment of Section 3.606 of the Commission's Rules and Regulations (Docket Numbers 8736 [fol. 770] and 8975), Amendment of the Commission's Rules, Regulations and Engineering Standards concerning the Television Broadcast Service (Docket Number 9175) and Utilization of Frequencies in the Band 470 to 890 Mcs. for Television Broadcasting (Docket Number 8976)", (the order being hereinafter called the "Order"). The effective date of the Order is November 20, 1950.

2. Wells-Gardner & Co., is a corporation duly organized and existing under the laws of the State of Illinois. It resides in the Northern District of Illinois, Eastern Division.

3. The Commission is an administrative tribunal created by said Communications Act of 1934, charged with carrying out the provisions of and enforcing said Act.

4. The United States of America is made a defendant in this suit pursuant to the provisions of the Act of June 25, 1948 (62 Stat. 969; 28 U. S. C. Section 2322), and said Communications Act of 1934 (48 Stat. 1064, 1093, and 63 Stat. 108; 47 U. S. C. Section 402 (a)).

5. Wells-Gardner & Co., is engaged in the manufacture and sale of radio and television receivers for mail order houses, chain store organizations and retail dealers. Some of its customers are Montgomery Ward & Company, Western Auto Supply Company of Kansas City, Gambles'

Skogmo, Inc., of Minneapolis, Western Auto Supply Company of Los Angeles, Schuster Stores of Milwaukee, Fair Store of Chicago, J. L. Hudson Company of Detroit, Halle Brothers of Cleveland, Firestone Tire and Rubber, Akron, Ohio. Since 1925 the Company has been engaged in the manufacture of radio receivers and since 1947 of television [fol. 771] receivers and has spent in excess of a million dollars for development work and facilities for the manufacture of such television receivers pursuant to standards set up by the Federal Communications Commission in 1941.

6. In 1950 up to the date of the filing of this complaint the Company has sold in excess of 60,000 television receivers at a total cost to the purchasers in excess of $11,000,000. It is presently manufacturing 300 sets a day.

7. The Company has an investment in excess of $3,000,000 in plant, machinery, patents and inventory devoted to the manufacture of television receivers and radio receivers.

8. The television receivers which are sold by the Company to the mail-order houses, chain store organizations and department stores hereinabove specified are in turn sold by such organizations direct to the general public and the demand for sets from the Company by such organizations is in turn based upon the demand by the public for such sets.

9. The demand for sets by the general public and consequent demand for sets from the Company by the organizations which it supplies is dependent upon the quality of the television programs broadcast to the general public; this in turn is dependent upon the willingness of advertisers to spend money upon the development of high-class television programs and upon the willingness of the people developing television to spend money in such development.

10. Anything which affects the high quality of broadcasts to the public directly affects the consumption of the products marketed by Wells-Gardner & Co.

[fol. 772] 11. Of the number of television receiver sets distributed to these organizations by Wells-Gardner & Co., and in turn distributed by such organizations to the general public in 1948, 100% were 10 inch tubes or smaller; in 1949, 60.5% were 10 inch tubes, 39.1% were 12 inch tubes, and .4% were 16 inch tubes; in the first four months of 1950, 32.8% were 12 inch tube and 67.2% were 16 inch tube. The Company at the present time, and the industry generally, is tooled for and has bought inventory for and is concentra-

ting its efforts on the manufacture of 16 inch tube sets or larger. Of the sets presently being manufactured by Wells-Gardner & Co., 100% are 16 inch tubes or larger.

12. Because of the fact that it sells directly to large chain and retail houses, who in turn sell directly to the public, the Company is close to the retail market and has a first-hand picture of the buying public's wants and requirements. On the basis of a market analysis made by the Company with its customers and their public it has found that since television receivers have advanced out of the hobby stage to the point where they are becoming a home necessity, the public is demanding better quality pictures. This is demonstrated by the fact that the refinements incorporated in Wells-Gardner and other sets to give better definition on 4 megacycle broadcast band reception have caused an increased demand for all such sets. Any conditions imposed upon the manufacturing industry which interfere with its attempts to improve the quality of pictures necessarily results in adverse buyer reaction and consequently in the lessening of the demand for television receivers.

[fol. 773] 13. The Company has had experience with the public's reaction to and lack of acceptance of short-wave adapters and FM adapters, gadgets which were marketed in an attempt to give the standard radio sets these additional receptions. The Company has found that the American housewife would not have her furniture altered by these additions. The Company has been totally unable to market this type of equipment.

14. The development of a widely accepted television industry; the phenomenal growth in the use of television receivers, in the quality of television broadcasting and receiving; the great increase in the amount of money spent on advertising in this industry, all have been bottomed on the fact that the industry could make investments in and spend money upon the manufacture of sets with the assurance that the standards for television receivers had been firmly established as a result of extended hearings before the Federal Communications Commission prior to 1941 and by the continued manufacture of sets pursuant to the standards as promulgated by the Commission in 1941.

15. This was the situation at the time the order complained of herein was entered by the Federal Communications Commission.

16. The standard television broadcast of today as established by the FCC standards is a broadcast of 30 still pictures a second with each picture having 525 lines. The CBS proposed color television broadcast would be a broadcast of 24 still pictures a second, each having 405 lines. Every set manufactured by Wells-Gardner & Co., and every set manufactured by the industry today, is able to receive only the broadcast of 30 still pictures a second, containing [fol. 774] 525 lines each. This means that if no additional work is done on the television receiver sets in the hands of the public and no additional money is expended, the television receivers in the hands of the public could not receive the CBS color television broadcasts in either black and white, or color. In order to permit of receiving the CBS color broadcasts in black and white, the present set would have to have placed in it what is called an "adapter". Estimates indicate this accessory if manufactured in quantity would retail at $40.00 to $50.00 plus installation costs, and after it has been put into the present television receiver, that receiver could still not get the color picture being broadcast by CBS. In order to get the CBS color picture an additional gadget would have to be purchased and put upon the television receiver. This gadget is sometimes referred to as a "color converter" and consists of a large wheel which is placed in front of the television receiver and which spins during the reception of the color broadcast at 1440 revolutions per minute plus a motor necessary to spin the color wheel and synchronize the equipment. Estimates indicate that this gadget can be manufactured in quantity at $100.00 to $200.00. Thus only by an additional expenditure of approximately $200.00, which is more than the present retail price of many black and white television receiver sets which deliver equal picture size, can the television receiver sets which are now in everyone's home be adapted to receive the CBS color picture. But even when this is done the picture received is not of the same high fidelity and definition which it is now possible to receive [fol. 775] on standard black and white receivers and such degradation cannot be corrected as long as the broadcast is one of 24 still pictures a second, containing 405 lines.

17. Even after the expenditure of these sums for adapters and converters, the set owner will receive a picture which is degraded, has a higher flicker content, and is limited to

a picture of 10 inches to 12½ inches in diameter as compared to the 16 inch or larger picture which he now is accustomed to receive.

18. On the other hand, there are in process of development, compatible color television systems that will broadcast color television with 525 lines per picture and 30 pictures per second.

The color broadcast of such systems will serve all 8 to 10 million owners with television pictures in black and white and also serve owners of new color television receivers with pictures in color.

Such pictures received in either black and white or color will be 16 inch, 20 inch or 24 inch in diameter, of fine definition without annoying flicker and provide a 25 to 40 million viewing audience to justify the advertising expense for good programs and finally, to make color television an added form of home entertainment.

The result is that the present television receiver owners will not be required to make additional expenditures and will not be afraid of set obsolescence.

[fol. 776] 19. Wells-Gardner & Co., sought to intervene in the hearing before the FCC on the question of what color standards should be adopted in order to present to the Commission its experience and researches as to public reaction to the various types of color standards advocated. Permission to intervene was denied.

20. Wells-Gardner & Co., is a member of the Radio and Television Manufacturers Association, formerly the Radio Manufacturers Association, which was made a party by the Commission to its hearings.

21. Since the adoption of the order of the Commission of October 10, 1950 various statements and broadcasts have been made by CBS and its employes which in effect informed the public that it would be undesirable for the public to purchase a standard black and white television receiver for a period of at least six months.

22. As a result of the action of the Commission, in promulgating its order of October 10, 1950 and as a result of such commentaries on the order by persons, informed and uninformed, orders for the purchase of standard black and white television receiver sets have fallen off considerably. Contracts entered into by Wells-Gardner & Co., for the sale of standard black and white television receiver

sets have been cancelled in the sum of $300,000 and it is likely that other purchasers will seek to cancel contracts in the near future. Orders for sets in the future, have decreased with the result that Wells-Gardner & Co., has and will suffer substantial financial loss.

[fol. 777] 23. The effect of the order complained of is to impair the existing market for black and white television receivers to the irreparable injury of Wells-Gardner & Co.

24. The effect of the order is to authorize the commercial broadcast of CBS color programs to the exclusion of other color programs and other color television standards with the result that the customers of Wells-Gardner & Co., will not be able to receive such color broadcast programs, even in black and white, without great additional expense and inconvenience of operation. This in turn results in destroying the reputation that Wells-Gardner & Co., has built up over a period of 25 years in the radio and television receiver field.

25. The effect of the order of the Commission is to deprive Wells-Gardner & Co., of income which was assured prior to the order of the Commission.

26. The Commission's order is illegal and void and beyond the power, authority and jurisdiction of the Commission for the following reasons:

A. The order deprives Wells-Gardner & Co., of property without due process of law, contrary to the Fifth Amendment of the Constitution of the United States.

B. The order of the Commission is arbitrary and capricious and results from the failure of the industry to comply with conditions imposed by the Commission which were illegal and beyond its authority to impose.

C. The order is unsupported by substantial evidence.

[fol. 778] D. The substantial evidence produced by the industry as a whole demonstrates that the system which the order of the Commission seeks to authorize is detrimental to the best interests of the public and of the advance of television broadcasting.

E. The order is invalid and illegal because of the refusal of the Commission to hear testimony of Wells-Gardner & Co., and other affected organizations which sought to give the Commission the benefit of their experience in the television field.

F. The order is contrary to the public interest, convenience and necessity.

G. The order violates Section 303(g) of the Communications Act of 1934.

H. The order is contrary to the terms of the Commission's notice of July 11, 1949.

27. The intervening complainant has no adequate remedy at law.

Wherefore,

1. Intervenor prays that the specially constituted Court of three judges convened to hear this matter issue a temporary interlocutory injunction herein restraining, enjoining and suspending until further order of this Court, the promulgation, operation and execution of the order of October 10, 1950 of the Federal Communications Commission.

2. That after final hearing this Court order, adjudge and decree that said order of the FCC is beyond the lawful [fols. 779-780] authority of the Commission, is in violation of the legal rights of the intervenor, and is wholly void, arbitrary and unreasonable and that its promulgation and operation be perpetually enjoined so that it be vacated and set aside.

3. That the intervenor have such other and further relief in the premises as is equitable and just and as may be deemed by this Court to be adequate and proper.

Wells-Gardner & Co., an Illinois corporation, by Robert S. Alexander, President.

Righeimer and Righeimer, by Frank S. Righeimer, Attorneys for Intervenor, 135 S. LaSalle Street.

Duly sworn to by Robert S. Alexander. Jurat omitted in printing.

[fol. 781] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

NOTICE—Filed November 10, 1950

To: Attorney General of the United States, Washington, D. C.;

United States Attorney for the Northern District of Illinois, United States Court House, Chicago, Illinois;

Federal Communication Commission, Washington, D. C.;

Kirkland, Fleming, Green, Martin & Ellis, Weymouth Kirkland, 33 N. La Salle Street, Chicago, Illinois;

Arvey, Hodes & Mantynband, One N. LaSalle Street, Chicago, Illinois;

Schapiro and Schiff, 38 S. Dearborn Street, Chicago, Illinois.

Please take notice that on November 10, 1950, at the opening of Court in the forenoon or as soon thereafter as counsel can be heard, the undersigned will appear before the Honorable Philip L. Sullivan, Judge of said Court, in the courtroom usually occupied by him in the United States Court House, Chicago, Illinois, and shall then and there present to the Court the motion of Television Installation Service Association to intervene as a plaintiff in the above-entitled cause, copies of which said motion and the proposed intervening complaint are served upon you herewith.

Schradzke and Gould, by Gerald Ratner, Attorneys for Television Installation Service Association, 33 N. La Salle Street, Chicago, Illinois.

[fol. 782] AFFIDAVIT OF SERVICE

STATE OF ILLINOIS,
County of Cook, ss:

Henry Litvak being first duly sworn on oath deposes and says that on the 4th day of November, 1950, at 12:30 P.M. Central Standard Time, he served the foregoing notice, together with a copy of motion attached thereto on the persons listed in said notice by placing a copy of said notice and of said motion in envelopes addressed respectively to said persons at the addresses set forth in the foregoing notice, and affixing to each of said envelopes the

required amount of United States postage stamps; that the envelopes addressed respectively to the Attorney General of the United States, to the United States Attorney for the Northern District of Illinois, and to the Federal Communications Commission, were sent by registered mail, return receipt requested; that the envelopes addressed to the other said persons were sent by ordinary mail; that each of said envelopes and contents were deposited at the United States Post Office in the United States Court House, Clark and Adams Streets, Chicago, Illinois, on said date and at said time.

Henry Litvak.

Subscribed and sworn to before me this 4th day of November, 1950. Martha Merkel, Notary Public.

[fol. 782a] [File endorsement omitted.]

[fol. 783] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

MOTION TO INTERVENE AS PLAINTIFF—Filed November 10, 1950

Television Installation Service Association, by its attorneys, moves to intervene as a Plaintiff in the above entitled action, pursuant to Rule 24 of the Federal Rules of Civil Procedure, on the following grounds:

1. A statute of the United States (Title 28 United States Code, Section 2323) confers an unconditional right on applicant to intervene herein. Applicant is an association interested in the proceeding and controversy before the Federal Communications Commission, in which the Order complained of was issued. Applicant is interested in the above entitled action commenced under Sections 2321-2325 of Title 28 United States Code to enjoin, set aside, annul and suspend the said Order of the Federal Communications Commission. The said action involves the validity of such Order and the interest of applicant.

2. The representation of applicant's interest by the existing parties may be inadequate, in that none of them is engaged in the television service industry in which applicant's members are engaged. The controversy presents [fol. 784] additional problems peculiar to the television service industry. Applicant may be bound by the judgment in the action.

3. In the alternative, applicant's claim and the main action have questions of law and of fact in common. Intervention by applicant will not unduly delay or prejudice the adjudication of the rights of the original parties.

Annexed to this Motion is the proposed intervening complaint of applicant.

Television Installation Service Association,
Schradzke and Gould, by Gerald Ratner, Its Attorneys.

Schradzke and Gould, Attorneys for Television Installation Service Association, 33 North LaSalle Street, Chicago 2, Illinois.

[fol. 785] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

INTERVENING COMPLAINT OF TELEVISION INSTALLATION SERVICE ASSOCIATION—Filed November 14, 1950

This intervening plaintiff, Television Installation Service Association (hereinafter referred to as "intervener"), for its intervening complaint herein, alleges as follows:

1. The original plaintiffs herein, Radio Corporation of America, National Broadcasting Company, Inc., and RCA Victor Distributing Corporation, filed their complaint herein on October 17, 1950, against United States of America and Federal Communications Commission, original defendants, to enjoin, set aside, annul and suspend an order of the Federal Communications Commission relating to color television.

2. Intervener admits each and all of the allegations of said complaint filed herein by said original plaintiffs.

3. Intervener's action, like the action of said original plaintiffs, is brought under the provisions of the Communi-

cations Act of 1934, as amended (48 Stat. 1064, 1093 and 63 Stat. 108; 47 U.S.C. Section 402 (a)) and of Title 28 United States Code (28 U.S.C. Sections 1336, 1398, 2284, 2321-25) [fol. 786] and Section 10 of the Administrative Procedure Act (60 Stat. 243; 5 U.S.C. Section 1009) to enjoin, set aside, annul and suspend the aforesaid order of the Federal Communications Commission, (hereinafter called the "Commission") adopted October 10, 1950, effective November 20, 1950, in proceedings entitled "In the Matters of Amendment of Section 3.606 of the Commission's Rules and Regulations (Docket Nos. 8736 and 8975), Amendment of the Commission's Rules, Regulations and Engineering Standards concerning the Television Broadcast Service (Docket No. 9175) and Utilization of Frequencies in the Band 470 to 890 Mcs. for Television Broadcasting (Docket No. 8976)", (the order being hereinafter called the "Order").

4. Intervener, Television Installation Service Association, is a corporation not for profit duly organized and existing under the laws of the State of Illinois, and resides in the Northern District of Illinois, Eastern Division, having its principal office in the City of Chicago, Illinois.

5. Intervener is a trade association, whose members include approximately 23 business firms, engaged in the installation and servicing of television receivers in the City of Chicago and its suburbs (hereinafter sometimes referred to as the "Chicago area").

6. Of the estimated 8,000,000 television receivers presently in the hands of the public throughout the United States, an estimated 600,000 television receivers are presently located in the Chicago area, representing an estimated audience of approximately 2,000,000 people and an estimated investment by the owners of such television receivers of over $1,500,000.

[fol. 787] 7. The television receiver-owning public in the Chicago area is now spending at the rate of $3,500,000 annually for the installation and servicing of television receivers.

8. More than 1,000 persons are employed by companies engaged in the installation and servicing of television receivers in the Chicago area, of which number more than half are employed by the member firms of intervener. Throughout the United States, many times that number of

persons are employed by television service companies. Such employees are for the most part highly skilled technicians who required extensive training to fit them for their jobs. Such training represents a considerable investment of time, effort and expense on the part of employees and employers alike.

9. The television service companies which are members of intervener have a considerable investment in their existing businesses. Such investment on the part of television service companies similarly engaged throughout the United States is many times greater. Expenditures throughout the United States by the television receiving set-owning public for installation and service have reached an annual rate of many millions of dollars.

10. During the past few years, the television industry has expanded rapidly based upon the transmission and reception of black and white television programs pursuant to commercial standards therefor heretofore established by the Commission. The service phase of the television industry has grown apace with the manufacturing, distributing, and broadcasting phases of the industry in meeting the needs of the public owning black and white television receiving sets, the number of which is now more than 8,000,000.

11. The purchaser of a television receiving set customarily enters into a written contract at the time of such purchase sometimes called an Owner's Service Policy, with a television service company obligating the latter, for a fixed sum, to perform the installation (including installation of necessary antenna, transmission line and other accessories, and installation, testing, and adjustment of the television receiver, and orientation for best possible reception) and also to perform service for a specified period, usually one year (including the maintenance of [fol. 788] the television receiver in proper working order and furnishing of any necessary replacement parts or tubes). The service rendered for the specified period requires a variable and indeterminate number of service calls depending upon the particular set and the requirements of the particular customer. In many cases, such written contracts or service policies, providing for a fixed charge and a variable amount of service, are renewed upon their expiration. In other instances, installation and/or

service are performed on the basis of a variable charge made according to the amount and nature of the work and the parts furnished. A substantial number of the television receiving sets in the hands of the public are presently being serviced pursuant to written contracts and service policies with television service companies.

12. Intervener's member firms have outstanding and unexpired written contracts and service policies obligating them to perform installation, maintenance and service and to furnish replacement parts on thousands of black and white television receiving sets in the Chicago area.

Existing Black and White Standards

13. The Commission established in 1941 the present commercial standards for the transmission and reception of black and white television. This single set of high-quality long-range technical standards, established after extensive hearings, has been the basis for the enormous popularity and phenomenal growth of the black and white television system.

14. The black and white television transmission standards provide for the broadcasting of a picture having 525 lines and 60 fields per second and approximately 200,000 picture elements, thereby affording a high degree of picture detail.

The Order Complained Of

15. On October 10, 1950, the Commission issued its Order, effective November 20, 1950, adopting for the commercial broadcasting of color television the color television system [fol. 789] of Columbia Broadcasting System, Inc., (hereinafter referred to as "CBS"). This is the Order complained of. A copy of this Order is annexed to the complaint of the original plaintiffs as Exhibit "H" thereto, and by this reference is expressly made a part hereof as though fully set forth herein.

CBS System Is Incompatible

16. The CBS color television system so adopted by the commission is an incompatible system. A "compatible" system is one whereunder the color television transmissions of that system can be received as a black and white picture on an existing black and white television receiving set with-

out making any changes in the set. Under the CBS system, no picture at all, either in color or black and white, can be received from broadcasts of the CBS color system by any of the more than 8,000,000 black and white television receivers presently in the hands of the public. To the extent that color programs are broadcast pursuant to the CBS standards, existing television receiving set owners will be deprived of a part of the television broadcast service, in reliance on which they purchased their sets, to their irreparable injury and detriment.

17. Evidence concerning two other color television systems was presented to the Commission prior to its acceptance of the CBS system. The system proposed by Radio Corporation of America (an original plaintiff, herein sometimes referred to as "RCA") is compatible. The other system, proposed by Color Television Incorporated, is theoretically compatible. Both of these compatible systems were rejected by the Commission in favor of the incompatible CBS system.

CBS Picture Is Degraded

18. In addition to its incompatibility, the CBS system adopted by the Commission, is a degraded system. Instead of a picture having 525 lines and 60 fields per second and 200,000 picture elements, as is the case of the present black and white picture, the CBS system produces a picture hav- [fol. 790] ing only 405 lines and 144 fields per second and 83,000 picture elements. This difference means much less picture detail and therefore a much inferior picture under the CBS system. The proposed RCA system is not subject to this objection of a degraded picture.

CBS System Is Mechanical, Not All-Electronic

19. The CBS color system is not an all-electronic system, as is the case of the proposed RCA and Color Television Incorporated systems, but is a mechanical system. The CBS system requires a rotating color wheel or disc to be placed at the front of the television receiving set. This mechanical wheel or disc must be of a diameter at least twice that of the picture tube in the set. The outer edges of the spinning disc rotate at a high rate of speed. This color wheel would have to be removed each time a black and white program was desired. The result is an awkward,

unattractive and space-consuming gadget which would ruin or seriously detract from the appearance of the television set itself and of the home in which the set is located. Manufacturers of television receiving sets have invested large sums in the designing of attractive cabinets which would fit into the furniture styles and arrangements of American homes. Most set owners have purchased their particular sets having in mind the appearance of the sets and cabinets as articles of furniture in their homes. This "furniture incompatibility" of the CBS mechanical disc is particularly a factor of no little significance among American women who have devoted their time, effort and expense to making their homes and furniture attractive.

CBS Picture Is Limited in Size

20. The CBS system is also objectionable because of its limitation in picture size. The maximum picture which it produces is a 12½ inch picture, whereas approximately 90% of the television receiving sets being presently sold have a picture size of 16 inches or larger. Thus, owners of sets with picture tubes larger than 12½ inches would suffer a [fol. 791] loss of picture size (after the conversion of their sets hereinafter discussed) in the reception of the CBS system color transmissions.

CBS System Requires Expensive Adapting and Converting

21. In order to receive CBS system color transmissions in black and white, owners of existing black and white television receiving sets must incur the additional expense of having their sets "adapted." Such adaptation will require an outlay from each set owner of from $80.00 to $100.00 for an adapter plus $10.00 to $15.00 more for its installation.

22. In order to receive the CBS system programs in color, it will further be necessary to add to existing sets a "converter" (consisting primarily of the spinning mechanical disc and its housing) at an estimated conversion cost of $200.00.

CBS Picture Quality Is Poor

23. As hereinabove set forth, even after adaptation, or after adaptation and conversion, the resulting black and white or color picture received under the CBS system is a degraded picture inferior in quality to the present stand-

ard black and white picture, lacking in detail and definition and limited in size. In addition, the CBS system picture is subject to flicker and color distortion and is of limited brightness and brilliance because of the color filter used.

Doubtful Adaptability and Convertibility

24. The adaptability and convertibility of existing television receiving sets is highly questionable. Similar conversions in the past, of so-called FM radio sets to the new band, which the Commission had stated could be done, met with almost universal failure. If the existing 8,000,000 television receiving sets can not successfully be adapted or converted, they will become obsolete insofar as color programs are concerned, thereby resulting in huge loss of investment and confidence on the part of the public.

Electrical Hazards

25. Major circuit changes required by such adaptation and conversion of a television set would void the approval [fol. 792] of Underwriters Radio Laboratory, and jeopardize the set owner's insurance coverage for fire or other hazards.

26. The greatly increased electrical load from the use of the color converting unit under the CBS system would overload already inadequate electrical wiring of many houses, causing fuse-blowing, fires and other hazards.

Bracket Standards

27. In the course of its adoption of the CBS color standards, the Commission has sought to impose on television manufacturers the adoption of so-called bracket standards in the manufacture of future black and white sets. These bracket standards would permit the broadcasting and reception of black and white television of either 525 lines, 60 fields per second (present black and white standards) or 405 lines, 144 fields per second (CBS standards). The required adoption of such bracket standards in the manufacture of future black and white receivers would entail substantial and wasteful increases in cost to the public for television receivers and for service, as well as far greater service problems to the service companies. Such large cost increases would only provide for variations in the standards of black and white transmissions, and would not

provide color pictures. The purpose of such bracket standards would be to provide a degraded compatibility for the CBS system on future television receivers.

Black and White Sales Will be Stopped

28. The premature and ill-advised adoption of the CBS system, and the public confusion and uncertainty thereby engendered, have and will continue to drastically curtail the sales of large existing stocks of black and white television receiving sets, all to the great detriment and irreparable injury of television manufacturers, broadcasters, distributors, dealers, and service companies. This sudden disruption of the rapidly growing television industry seriously threatens the huge investment therein of all concerned. The loss of new installations and servicing already jeopardizes the business future of many service companies and their employees.

[fol. 793] Parts and Tube Shortages Aggravated

29. Adoption of the CBS color system at the present time will aggravate parts and tube shortages which are already acute. Color television at this stage will add many components and a number of new types of tubes to existing demands. Present requirements for parts and tubes can not be filled adequately. The new requirements will mean new confusion.

Shortage of Trained Service Personnel

30. The existing insufficiency of qualified service personnel makes it virtually impossible for service companies to undertake the adaptation and conversion of several million existing sets in the hands of the public. The present national defense effort is draining the supply of technically trained personnel available to the television service industry, which already has an extremely grave man power shortage.

No Public Demand for Color

31. The alleged demand for color on the part of the public in television can not be substantiated. The motion picture industry has had color for 20 years, and yet today only a small percentage of its production is in color. A well-estab-

lished industry such as the motion picture industry can not carry the heavy cost burden of color. The infant television industry should not be saddled with this excessive cost burden at a time when it might bring economic catastrophe.

CBS Color System Is Premature

32. Color systems at their present stage of development are not yet ready for the television industry, nor is the television industry at its present stage of economic growth yet ready for color systems. Other industries, such as the automobile industry, have been permitted to grow in an orderly fashion. The Commission is attempting to use its control over the television industry to force changes which are premature and economically unsound.

[fol. 794] Service Problems for CBS Color Will Ruin Good-Will

33. The television service industry will be faced with demands by set owners, unfamiliar with the limitations of the CBS color system, for reception of new color transmissions in black and white and in color equivalent in quality to present reception of black and white transmissions. The anticipated inability to satisfy such unwarranted demands will create havoc with existing customer relations, cause complications under existing written contracts and owner's service policies, and destroy the good-will heretofore built up by service companies. The unacceptable picture quality under the CBS color system, as well as the other difficulties herein set forth attendant upon the adoption of this system, will be transmuted by a confused public to ill-feeling toward and dissatisfaction with the service companies.

Opposition to Order

34. The Order complained of is opposed by most of the television manufacturers, engineers, broadcasters (except CBS), distributors, dealers, service companies, and the public. The Order is based on scientifically incorrect conclusions. Two members of the Commission were opposed to the Order, as against five for it. The Order failed to properly consider and was contrary to the evidence submitted. The Commission's staff engineer had an improper interest in the adoption of the CBS system. The Commis-

sion's notice of July 11, 1949, pursuant to which the hearings were held, proposed consideration of color systems by which pictures could be received on existing receivers "simply by making relatively minor modifications in such existing receivers."

Order Is Illegal and Improper.

35. The Commission's Order is illegal, void and beyond the power, authority and jurisdiction of the Commission for the following reasons:

(a) The Order is contrary to the public interest, convenience and necessity, the basic statutory standard contained in the Communications Act of 1934.

[fol. 795] (b) The Order violates Section 303(g) of the Communications Act of 1934.

(c) The Order is unsupported by substantial evidence, is arbitrary and capricious, and is an abuse of discretion.

(d) The Order was adopted before the Commission had discharged its statutory duty to inform itself adequately before issuing a final order in a rule-making proceeding. The Commission wrongfully refused to consider additional evidence of determinative significance to its decision.

(e) The Order is predicated upon the rejection by the television industry of the arbitrary and illegal attempt by the Commission to impose the so-called bracket standards as a condition to the allowance of more time for the development of all color television systems.

(f) The Order is contrary to the terms of the Commission's Notice of July 11, 1949, pursuant to which the hearings on which the Order purports to be based were held.

(g) On the facts disclosed, the Commission's staff engineer should not have been permitted to continue in the proceeding.

(h) The Order deprives intervener's members of property without due process of law, contrary to the Fifth Amendment to the Constitution of the United States.

Irreparable Injury—No Adequate Remedy

36. Unless this Court restrains, enjoins, and suspends the promulgation, operation and execution of the Order complained of, both temporarily and permanently, as prayed for herein, intervener and its members and television service companies generally and the television industry as a whole and the public will suffer and will continue to suffer the irreparable injury hereinabove alleged and described, for which they have no adequate remedy at law.

[fol. 796] Wherefore, intervener prays:

A. That this Court, as soon as practicable, convene a specially constituted court of three judges, as required by Title 28, United States Code (28 U. S. C. Sections 2284, 2325) and that a temporary or interlocutory injunction be entered herein restraining, enjoining and suspending until the further order of this Court the promulgation, operation, and execution of the Order.

B. That, after final hearing, this Court adjudge, order and decree that the Order is, and has at all times been, beyond the lawful authority of the Commission, in violation of the legal rights of plaintiffs and intervener, and is wholly void, arbitrary and unreasonable, and that the Order be permanently and perpetually vacated, set aside, suspended and annulled, and the promulgation, operation and execution thereof permanently and perpetually restrained and enjoined.

C. That plaintiffs and intervener may have such other and further relief in the premises as to equity and justice may appertain and as may be deemed by this Court to be adequate and proper under the circumstances.

Schradzke and Gould. By Gerald Ratner. Attorneys for Television Installation Service Association, intervener, 33 N. LaSalle Street, Chicago 2, Illinois.

[fol. 797] *Duly sworn to by Frank J. Moch. Jurat omitted in printing.*

[fol. 797a] [File endorsement omitted]

[fol. 798] And afterwards, on, to wit, the 20th day of November, 1950 there was filed in the Clerk's office of said

Court two (2) certain Subpoena Duces Tecum, With Marshal's Return Endorsed Thereon, in words and figures following, to wit:

[fol. 799] District Court of the United States of America Northern District of Illinois

Subpoena Duces Tecum. Case No. 50 C 1459

The President of the United States of America

To Federal Communications Commission:

—Greeting:

We command you, that all business and excuses being laid aside, you and each of you attend before the Honorable J. Earl Major, Philip L. Sullivan and Walter J. LaBuy, *en banc*, Judges of the District Court of the United States for said District, on the 14th day of November, A. D. 1950, at 10:30 o'clock in the forenoon in Room 605, United States Court House in Chicago, in said District, to testify and give evidence in a certain cause now pending and undetermined in said Court, wherein Radio Corporation of America, National Broadcasting Company, Inc. and RCA Victor Distributing Corporation, are Plaintiffs and United States of America, Federal Communications Commission and Columbia Broadcasting System, Inc., are Defendants, on the part of Pilot Radio Corporation, Applicant for intervention, as Plaintiff, and that you also diligently and carefully search for, examine, and inquire after and bring with you, and produce at the time and place aforesaid, All letters, copies of letters, correspondence, memorandums, telegrams, copies of telegrams, written communications and copies of written communications, between the Hon. Edwin C. Johnson, U. S. Senator for the State of Colorado and Chairman of the Senate Committee on Interstate and Foreign Commerce, individually and as chairman of said committee, or any agent, employee or servant of said senator or committee and Federal Communications Commission or any member, agent, attorney, employee or servant thereof, referring or relating to or in any wise appertaining to color television, or experiments, controversies, issues or disputes with respect thereto, or to the adoption or non-adoption of standards for color television broadcasting, or the issuance or non-issuance of permits or licenses therefor, together with

all copies, drafts, and vouchers relating to the said documents, and all other documents, letters, and paper writings whatsoever, that can or may afford any information or evidence in said cause. And this you shall in nowise omit, under the penalty of the law in that case made and provided.

To the Marshal of the Northern District of Illinois to execute and return in due form of law.

Witness, the Honorable Philip L. Sullivan, Judge of the said Court, at Chicago, in said District, this 8th day of November, in the year of our Lord one thousand nine hundred and Fifty, and of the Independence of the United States of America the 175th year.

Roy H. Johnson, Clerk. (Seal.)

[fol. 800] State of Illinois,
County of Cook—ss:

S. Huber Adams, being duly sworn, on his oath, deposes and states that on the 9th of Nov. A D 1950 he served the within Subpoena on the within named Federal Communications Commission and delivered to Mrs. M. L. Holleman (Secretary to Regional .....) a true copy of thereof.

S. Huber Adams, Served by La Salle Process Servers.

(Seal.) Subscribed and sworn to before me this 10th day of November A D 1950.

Beatrice Leibovitz, Notary Public.

[fols. 801-803] District Court of the United States of America, Northern District of Illinois

Subpoena Duces Tecum. Case No. 50C 1459

The President of the United States of America

To Columbia Broadcasting System, Inc.—Greeting:

We command you, that all business and excuses being laid aside, you and each of you attend before the Honorable J. Earl Major, Philip L. Sullivan and Walter J. LaBuy, *en banc*, Judges of the District Court of the United States

for said District, on the 14th day of November, A. D. 1950, at 10:30 o'clock in the forenoon in Room 605 United States Court House in Chicago, in said District, to testify and give evidence in a certain cause now pending and undetermined in said Court, wherein Radio Corporation of America, National Broadcasting Company, Inc. and RCA Victor Distributing Corporation, are Plaintiffs and United States of America, Federal Communications Commission and Columbia Broadcasting System, Inc., are Defendants, on the part of Pilot Radio Corporation, applicant for Intervention, as Plaintiff, And that you also diligently and carefully search for, examine, and inquire after and bring with you, and produce at the time and place aforesaid, All letters, copies of letters, correspondence, memorandums, telegrams, copies of telegrams, written communications and copies of written communications between the Hon. Edwin C. Johnson, U. S. Senator for the State of Colorado and Chairman of the Senate Committee on Interstate and Foreign Commerce, individually and as chairman of said committee, or any agent, employee or servant of said senator or committee and Columbia Broadcasting System, Inc., or any officer, agent, attorney, employee or servant thereof, referring or relating to or in any wise appertaining to color television, or experiments, controversies, issues or disputes with respect thereto, or to the adoption or non-adoption of standards for color television broadcasting, or the issuance or non-issuance of permits or licenses therefor, together with all copies, drafts, and vouchers relating to the said documents, and all other documents, letters, and paper writings whatsoever, that can or may afford any information or evidence in said cause. And this you shall in nowise omit, under the penalty of the law in that case made and provided.

To the Marshal of the Northern District of Illinois to execute and return in due form of law.

Witness, the Honorable Philip L. Sullivan, Judge of the said Court, at Chicago, in said District, this 8th day of November, in the year of our Lord one thousand nine hundred and Fifty, and of the Independence of the United States of America the 175th year.

Roy H. Johnson, Clerk.

[fol. 804] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

NOTICE—Filed November 10, 1950

To: Kirkland, Fleming, Green, Martin & Ellis, 33 N. LaSalle Street, Chicago, Illinois, Attorneys for Plaintiffs;
Otto Kerner, U. S. District Attorney, U. S. Court House, Chicago, Illinois, Attorney for Defendants;
Arvey, Hodes & Mantynband, 1 N. La Salle Street, Attorneys for Columbia Broadcasting Co.;
Shapiro & Shiff, 38 S. Dearborn, Attorneys for Pilot Radio Corporation.

You and each of you are hereby notified that on Friday, November 10, 1950 at the hour of 10:00 A.M. in the forenoon, or as soon thereafter as counsel can be heard, I shall appear before his Honor, Judge Phillip L. Sullivan in Room 605, United States Court House, Chicago, Illinois, or before such other judge as may be sitting in his place and stead, and then and there ask leave to file an intervening Petition and Appearance of Sightmaster Corp., a copy of which Petition is hereto attached and served upon you.

At which time and place you may appear if you so see fit.

Carl Pomerance, Attorney for Sightmaster Corp., 135 S. La Salle Street, Fr. 2-1815.

[fol. 805] STATE OF ILLINOIS,
County of Cook, ss.:

Margaret Burke, being first duly sworn on oath deposes and says that she served the foregoing notice by mailing an exact copy to the parties in a sealed envelope, 1st class mail, U. S. Postage prepaid and depositing in U. S. mail chute at 135 S. La Salle St., this 8th day of November, 1950.

Margaret Burke.

Subscribed and sworn to before me this 8th day of November, 1950. David H. Mendelsohn, Notary Public.

[fol. 805a] [File endorsement omitted.]

[fol. 806] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

PETITION TO INTERVENE—Filed November 10, 1950

Your Petitioner, Sightmaster Corp., a corporation, by Carl Pomerance, its attorney, respectfully represents unto this Honorable Court as follows:

1. That it is a corporation duly organized and existing under and by virtue of the laws of the State of New York; that its principal office and factory is located at 111 Cedar Street, New Rochelle, New York, and that said corporation is now and has been engaged in the manufacture and sale of television receivers and television glass; that said corporation has a very substantial investment in said enterprise and has been receiving revenue from, and been selling, distributing and delivering to manufacturers, distributors and dealers, television sets and television glass throughout the United States.

2. That on or about the 11th day of October, 1950 there were, in the United States, about 107 television stations licensed by the Federal Communications Commission to broadcast and were broadcasting in black and white; that there were approximately eight million (8,000,000) black and white television receiving sets owned by the public.

[fol. 807] 3. That on said 11th day of October, 1950 the Federal Communications Commission authorized the Columbia Broadcasting System, Inc. to begin commercial Broadcasting of its color television system which would materially affect the use, operation and reception of the eight million (8,000,000) television sets owned by the general public representing a purchase price of approximately Two Billion Dollars ($2,000,000,000.00).

4. That because the petitioner corporation is in the manufacture, sale and distribution of television receivers and television glass; and because the order of the Federal Communications Commission authorizing the Columbia Broadcasting System is incompatible with the television receivers manufactured, sold and distributed by the plaintiff; and since said system impairs the advantages of compatibility now possessed by the existing television receivers and since your petitioner corporation has an interest in many of the issues set forth and contained in the Complaint in this cause,

and a determination and finding upon the issues will materially affect not only the substantial investment of the petitioner corporation in its present office and factory, machinery, and equipment, but also will affect the future capital income of said petitioner corporation, and since your petitioner corporation does have a substantial interest in and to the various issues involved in the proceeding, your petitioner corporation respectfully prays that this Honorable Court will permit it to intervene as a party to this cause, file its appearance, receive notice of the various motions and orders and also be given leave to plead as may be necessary or required.

Wherefore your petitioner prays that an Order be entered authorizing it to intervene in the above cause, file its appearance, receive notice of hearings and plead as may be required.

Sightmaster Corp., a corporation, by Carl Pomerance, Attorney for Petitioner.

Carl Pomerance, Attorney for Sightmaster Corp., 135 S. La Salle Street, Franklin 2-1815.

[fols. 808-809] *Duly sworn to by Carl Pomerance. Jurat omitted in printing.*

[fol. 810] In the United States District Court

[Title omitted]

Intervening Complaint of Sightmaster Corp.—Filed November 14, 1950

Sightmaster Corp. a New York Corporation, leave of Court first had and obtained, intervenes in the above entitled cause and for its complaint herein alleges:

1. It brings its action pursuant to the provisions of the Communications Act of 1934 as amended (48 Stat. 1064, 1093 and 63 Stat. 108; 47 U. S. C. Section 402 (a)) and of Title 28 United States Code (26 U. S. C. Sections 1336, 1398, 2284, 2321-25) and Section 10 of the Administrative Procedure Act (60 Stat. 243; 5 U. S. C. Section 1009), to enjoin, set aside, annul and suspend an order of the Federal Communications Commission (hereinafter called the

"Commission") adopted October 10, 1950 in proceedings entitled "In the Matters of Amendment of Section 3.606 of the Commission's Rules and Regulations (Docket Numbers 8736 and 8975); Amendment of the Commission's Rules, Regulations and Engineering Standards concerning the Television Broadcast Service (Docket Number 9175) and Uitlization of Frequencies in the Band 470 to 890 Mcs. for Television Broadcasting (Docket Number 8975)", (the order being hereinafter called the "Order"). The effective date of the Order is November 20, 1950.

[fol. 811] 2. Sightmaster Corp. is a corporation duly organized and existing under the laws of the State of New York.

3. The Commission is an administrative tribunal created by said Communications Act of 1934, charged with carrying out the provisions of and enforcing said Act.

4. The United States of America is made a defendant in this suit pursuant to the provisions of the Act of June 25, 1948 (62 Stat. 969; 28 U. S. C. Section 2322), and said Communications Act of 1934 (48 Stat. 1064, 1093 and 63 Stat. 108, 47 U. S. C. Section 402 (a)).

5. Sightmaste Corp. is engaged in the manufacture, sale and distribution of television receivers and television glass. The company has been engaged in the manufacture of said television receivers and television glass since 1947 and has spent large sums of money for machinery, equipment, development work and facilities in the manufacture of television receiver sets pursuant to the standards set by the Commission in 1941.

6. Since said company has commenced the manufacture of television sets in 1947, it has manufactured and sold sets in excess of One and One Half Million Dollars ($1,500,000.00) retail price.

7. The company has an investment exceeding One Hundred Twenty Five Thousand Dollars ($125,000.00) in plant machinery, patents, inventory and equipment devoted to the manufacture of television receiver sets.

8. The television receiver sets which are sold by the company to its purchasers, are in turn, sold by them to the general public and their demand is based upon the public's demand for such receivers and sets.

9. The demand for sets by the general public and consequent demand for sets from the Company by the organizations which it supplies, is dependent upon the quality of

the television programs broadcast to the general public; this in turn is dependent upon the willingness of advertisers [fol. 812] to spend money upon the development of high-class television programs and upon the willingness of the people developing television to spend money in such development.

10. Anything which affects the high quality of broadcasts to the public directly affects the consumption of the products marketed by Sightmaster Corp.

11. The company, at the present time, and the general industry, to the best information of this company, has purchased inventory and is tooled for and concentrating upon the manufacture of television receiver sets under the existing regulations.

12. Because of the fact that it sells directly to large chain and retail houses, who in turn, sell directly to the public, the Company is close to the retail market and has a first hand picture of the buying public's wants and requirements. On the basis of a market analysis made by the Company with its customers and their public, it has found that since television receivers have advanced out of the hobby stage to the point where they are becoming a home necessity, the public is demanding better quality pictures. This is demonstrated by the fact that the refinements incorporated in Sightmaster Corp. and other sets to give better definition on 4 megacycle broadcast and reception, have caused an increased demand for all such sets. Any conditions imposed upon the manufacturing industry which interfere with its attempts to improve the quality of pictures necessarily results in adverse buyer reaction and consequently in the lessening of the demand for television receiver chassis.

13. The Company has had experience with the public's reaction to and lack of acceptance of short-wave adapters and FM adapters, gadgets which were marketed in an attempt to give the standard radio sets these additional receptions. The Company has found that the American housewife would not have her furniture altered by these additions. The Company has been totally unable to market this type of equipment.

[fol. 813] 14. The development of a widely accepted television industry; the phenomonal growth in the use of television receivers, in the quality of television broadcasting and receiving; the great increase in the amount of money

spent on advertising in this industry, all have been bottomed on the fact that the industry could make investments in and spend money upon the manufacture of sets with the assurance that the standards for television receivers had been firmly established as a result of extended hearings before the Federal Communications Commission prior to 1941 and by the continued manufacture of sets pursuant to the standards as promulgated by the Commission in 1941.

15. This was the situation at the time the order complained of herein was entered by the Federal Communications Commission.

16. The standard television broadcast of today as established by the FCC standards is a broadcast of 30 still pictures a second with each picture have 525 lines. The CBS proposed color television broadcast would be a broadcast of 24 still pictures a second, each having 405 lines. Every set manufactured by Sightmaster Corp. and every set manufactured by the industry today is able to receive only the broadcast of 30 still pictures a second, containing 525 lines each. This means that if no additional work is done on the television receiver sets in the hands of the public and no additional money is expended, the television receivers in the hands of the public could not receive the CBS color television broadcasts in either black or white, or color. In order to permit receiving the CBS color broadcasts in black and white, the present set would have to have placed in it what is called and "adapter". Estimates indicate this accessory, if manufactured in quantity, would retail at $40.00 to $50.00 plus installation costs, and after it has been put into the present television receiver, that receiver could [fol. 814] still not get the color picture being broadcast by CBS. In order to get the CBS color picture, an additional gadget would have to be purchased and put upon the television receiver. This gadget is sometimes referred to as a "color converter" and consists of a large wheel which is placed in front of the television receiver and wheel spins during the receptions of the color broadcast at 1440 revolutions per minute, plus a motor necessary to spin the color wheel and synchronize the equipment. Estimates indicate that this gadget can be manufactured in quantity at $100.00 to $200.00. Thus, only by an additional expenditure of approximately $200.00, which is more than the present retail price of many black and white television receiver sets which deliver equal picture size, can the tele-

vision receiver sets in the home possible be adapted to receive the CBS color picture. In addition to the so-called adaptor, other structural changes are necessary; a change in the fly-back transformer which will cause new electronic complications. Were this change made, the picture received would not be of the same height, fidelity and definition which it is now possible to receive on standard black and white receivers, and is limited to a 10 or 12½ inch picture. Such degradation cannot be corrected as long as the broadcast is one of 24 still pictures a second, containing 405 lines.

17. No satisfactory black and white picture comparable in quality to other black and white pictures, can be produced on any existing 16 or 19 inch television receiver by use of the so-called adapter. For this reason alon*g*, this adaptor is net feasible or commercially practical.

18. There are in process of development, compatible color-television systems that will broadcast color television with 525 lines per picture and 30 pictures per second and which will serve all 8 to 10 million owners with television pictures in black and white as well as owners of new color television receivers with color pictures.

[fol. 815] Such pictures received in either black and white or color will be 16 inch, 20 inch or 24 inch in diameter, of fine definition without annoying flicker and provide a 25 to 40 million viewing audience to justify the advertising expense for good programs and finally, to make color television an added form of home entertainment.

The result is that the present television receiver owners will not be required to make additional expenditures and will not be afraid of set obsolescence.

19. Since the adoption of the Order of the Commission of October 10, 1950, various statements and broadcasts liave been made by CBS and its employees which, in effect, informed the public that it would be undesirable for the public to purchase a standard black and white television receiver for a period of at least six months.

20. As a result of the action of the Commission in promulgating its order of October 10, 1950 and as a result of such commentaries on the order by persons, informed and uninformed, orders for purchase of standard black and white television receiver sets have fallen off considerably. Orders for sets in the future have decreased with the result that Sightmaster Corp. has suffered a substantial financial loss in that it has stopped all its television sets production at

the present time until a clarification and determination of this issue, at which time the company will commence production again. The information and publicity has materially affected the orders and purchases of television receiver sets by this company to the extend that, at the present time, it is no longer profitable to continue the manufacture and productions.

21. The effect of the Order complained of is to impair the existing market for black and white television receivers to the irreparable injury of Sightmaster Corp.

[fol. 816] 22. The effect of the order is to authorize the commercial broadcast of CBS color programs to the exclusion of other color programs and other color television standards with the result that the customers of Sightmaster Corp. will not be able to receive such color broadcast programs, even in black and white, without great additional expense and inconvenience of operation. This in turn results in destroying the reputation that Sightmaster Corp. has built up over a period of years in the radio and television receiver field.

23. The effect of the order of the Commission is to deprive Sightmaster Corp. of income which was assured prior to the order of the Commission.

24. The Commissions' order is illegal and void and beyond the power, authority and jurisdiction of the Commission for the following reasons:

a. The order deprives Sightmaster Corp. of property without the process of law, contrary to the Fifty Amendment of the Constitution of the United States.

b. The order of the Commission is arbitrary and capricious and results from the failure of the industry to comply with conditions imposed by the Commission which were illegal and beyond its authority to impose.

c. The order is unsupported by substantial evidence.

d. The substantial evidence produced by the industry as a whole demonstrates that the system which the Order of the Commission seeks to authorize is detrimental to the best interests of the public and of the advance of television broadcasting.

e. The order is contrary to the public interest, convenience and necessity.

f. The order violates Section 303 (g) of the Commissions Act of 1934.

[fols. 817-818] g. The order is contrary to the terms of the Commission's Notice of July 11, 1949.

25. The intervening complainant has no adequate remedy at law.

WHEREFORE:

1. Intervenor prays that the specifically constituted Court of three judges convened to hear this matter issue a temporary interlocutory injunction herein restaining, enjoining and suspending, until further order of this Court, the promulgation operation and execution of the order of October 10, 1950 of the Federal Communications Commission.

2. That after final hearing, this Court order, adjudge and decree that said order of the FCC is beyond the lawful authority of the Commission, is in violation of the legal rights of the intervenor, and is wholly void, arbitrary and unreasonable and that its promulgation and operation be perpetually enjoined so that it be vacated and set aside.

3. That the intervenor have such other and further relief in the premises as is equitable and just and as may be deemed by this Court to be adequate and proper.

Sightmaster Corp. a New York corporation by Michael L. Kaplan, President.

Carl Pomerance Attorney for Intervenor, 135 S. La Salle Street.

Duly sworn to by Michael L. Kaplan. Jurat omitted in printing.

[fol. 819] [Title omitted]

Notice—Filed November 10, 1950

Please take notice, that on November 10, 1950, at the opening of Court in the forenoon of that day, or as soon thereafter as counsel can be heard, the undersigned will appear before the Honorable Philip L. Sullivan, Judge of the aforesaid Court, in the courtroom usually occupied by him in the United States Court House, Chicago, Illinois, and

shall present to the Court the attached written motion for an Order granting leave to The Radio Craftsmen Incorporated, to intervene as a plaintiff in the above entitled proceeding, and for leave to join with the plaintiffs and to adopt their Complaint and Motion for Temporary Injunction and other relief.

Kelly, Kelly & Kelly, By: John Kelly, Jr. A member of the Firm. Attorneys for The Radio Craftsmen, Incorporated.

Dated: November 10, 1950.

[fol. 820] To: Weymouth Kirkland, Esq. and Kirkland, Fleming, Green, Martin & Ellis, Esqs. Attorneys for Radio Corporation of America, National Broadcasting Company, Inc. and RCA-Victor Distributing Corporation, 33 North La Salle Street, Chicago, Illinois. Cahill, Gordon, Zachary & Reindel, Esqs. of counsel to Radio Corporation of America, National Broadcasting Company, Inc. and RCA-Victor Distributing Corporation, 63 Wall Street, New York, New York. Hon. J. Howard McGrath, Attorney General of the United States, Washington, D. C. Otto Kerner, Jr., Esq. United States Attorney for the Northern District of Illinois Chicago, Illinois. Benedict P. Cottone, Esq. General Counsel, Federal Communications Commission, Washington, D. C. Schapiro & Schiff attorneys for Pilot Radio Corporation.

[fol: 821] Received copies of the foregoing Notice and the foregoing Motion to Intervene as a Plaintiff.

Weymouth Kirkland, Esq. and Kirkland, Fleming, Green, Martin & Ellis, Esqs. Attorneys for Radio Corporation of America, National Broadcasting Co., Inc. and RCA-Victor Distributing Corporation. By: Andrew C. Hamilton. Honorable J. Howard McGrath, Attorney General of the United States. By: Otto Kerner, Jr., Esq., United States Attorney for the Northern District of Illinois. By: Anthony Scoriaieon. Benedict P. Cottone, Esq., General Counsel, Federal Communications Commission. By: Arvey Hades & Mantynband. By: LeRoy R. Krein. Schapiro & Schiff. By: B. Schiff, Attorney for Pilot Radio Corporation.

[fol. 822] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

MOTION TO INTERVENE AS A PLAINTIFF—Filed November 10, 1950

To the Judges of the District Court of the United States, for the Northern District of Illinois, Eastern Division:

The Radio Craftsmen Incorporated, an Illinois Corporation, moves to intervene as a plaintiff in the above entitled cause on the following grounds:

1. Applicant is a corporation engaged in the manufacture of television receivers with its principal place of business in Chicago, Illinois.

2. The above entitled cause was commenced in this court by the filing of a Complaint on October 17, 1950.

3. Said complaint seeks to have a certain order of the Federal Communications Commission approving the CBS color television system declared null and void and the promulgation, operation and execution thereof restrained and enjoined.

[fol. 823] 4. Applicant is interested in the above entitled action in that it has been adversely affected by said order of the Federal Communications System and has suffered and will continue to suffer damage as a result thereof unless said order is enjoined and set aside, all as more fully set forth in applicant's proposed complaint herein, a copy of which is attached hereto.

5. Applicant has the right, conferred by statute of the United States, to intervene in this action; see Communications Act of 1934 as amended (48 Stat. 1064, 1093, 65 Stat. 108; 47 U.S.C. Section 402 (a) and the provisions of Title 28 of the United States Code (28 U.S.C., Sections 2321 to 2325 inclusive).

6. The Radio Craftsmen, Incorporated, is inadequately represented in the present proceedings and that it may be bound by a judgment in these proceedings.

7. In the alternative applicant submits that the conditional right conferred upon it by 63 Stat. 108; Title 26 U.S.C. Section 2323 should be recognized and affirmed by this Court inasmuch as The Radio Craftsmen, Incorporated and is a corporation interested in the question before the Fed-

eral Communications System which is the subject of this complaint heretofore filed in this cause; and inasmuch as applicant's claim and the main action have a question of law and fact in common; and inasmuch as the intervention of applicant will not delay or prejudice adjudication of the rights of the original parties to this action.

The Radio Craftsmen, Incorporated, By: John H. Cashman, President.

Kelly, Kelly and Kelly, Attorneys for Applicant for Intervention.

[fols. 824-825] *Duly sworn to by John H. Cashman. Jurat omitted in printing.*

[fol. 826] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

INTERVENING COMPLAINT—Filed November 14, 1950

The Radio Craftsmen Incorporated, an Illinois corporation, leave of Court first had and obtained, intervenes in the above entitled cause and for its complaint herein alleges:

1. It brings its action pursuant to the provisions of the Communications Act of 1934, as amended (48 Stat. 1064, 1093 and 63 Stat. 108; 47 U.S.C. Section 402 (a)) and of Title 28 United States Code (26 U.S.C. Sections 1336, 1398, 2284, 2321-25) and Section 10 of the Administrative Procedure Act (60 Stat. 243; 5 U.S.C. Section 1009), to enjoin, set aside, annul and suspend an order of the Federal Communications Commission (hereinafter called the "Commission") adopted October 10, 1950 in proceedings entitled "In the Matters of Amendment of Section 3.606 of the Commission's Rules and Regulations (Docket Numbers 8736 and 8975), Amendment of the Commission's Rules, Regulations [fol. 827] and Engineering Standards concerning the Television Broadcast Service (Docket Number 9175) and Utilization of Frequencies in the Band 470 to 890 Mcs. for Television Broadcasting (Docket Number 8976)", (the order being hereinafter called the "Order"). The effective date of the Order is November 20, 1950.

2. The Radio Craftsmen Incorporated, is a corporation duly organized and existing under the laws of the State of

Illinois. It resides in the Northern District of Illinois, Eastern Division.

3. The Commission is an administrative tribunal created by said Communications Act of 1934, charged with carrying out the provisions of and enforcing said Act.

4. The United States of America is made a defendant in this suit pursuant to the provisions of the Act of June 25, 1948 (62 Stat. 969; 28 U.S.C. Section 2322), and said Communications Act of 1934 (48 Stat. 1064, 1093, and 63 Stat. 108, 47 U.S.C. Section 402 (a)).

5. The Radio Craftsmen Incorporated, is engaged in the manufacture and sale of radios and high fidelity custom television receiver chassis. Since 1943 the Company has been engaged in the manufacture of radio receivers and since 1949 of custom television receiver chassis, and has spent huge sums for development work and facilities for the manufacture of such television receiver chassis, pursuant to standards set up by the Federal Communications Commission in 1941.

[fol. 828] 6. In 1950 up to the date of the filing of this complaint the Company has sold in excess of 3,000 television receiver chassis, at a total cost to the purchasers in excess of $500,000.00. It is presently manufacturing 60 sets a day.

7. The Company has an investment in excess of $167,000.00 in plant, machinery, patents and inventory devoted to the manufacture of television receiver chassis and radio receivers.

8. The television receiver chassis which are sold by the Company to its purchasers are in turn sold by such organizations direct to the general public and the demand for sets from the Company by such organizations is in turn based upon the demand by the public for such sets.

9. The demand for sets by the general public and consequent demand for sets from the Company by the organizations which it supplies is dependent upon the quality of the television programs broadcast to the general public; this in turn is dependent upon the willingness of advertisers to spend money upon the development of high-class television programs and upon the willingness of the people developing television to spend money in such development.

10 Anything which affects the high quality of broadcasts to the public directly affects the consumption of the products marketed by The Radio Craftsmen Incorporated.

11. The Company at the present time, and the industry generally, is tooled for and has bought inventory for and is concentrating its efforts on the manufacture of 16 inch tube sets or larger. Of the sets presently being manufactured by The Radio Craftsmen Incorporated, 100% are 16 inch tubes or larger.

[fol. 829] 12. Because of the fact that it sells directly to large chain and retail houses, who in turn sell directly to the public, the Company is close to the retail market and has a first-hand picture of the buying public's wants and requirements. On the basis of a market analysis made by the Company with its customers and their public it has found that since television receivers have advanced out of the hobby stage to the point where they are becoming a home necessity, the public is demanding better quality pictures. This is demonstrated by the fact that the refinements incorporated in The Radio Craftsmen Incorporated and other sets to give better definition on 4 megacycle broadcast and reception have caused an increased demand for all such sets. Any conditions imposed upon the manufacturing industry which interfere with its attempts to improve the quality of pictures necessarily results in adverse buyer reaction and consequently in the lessening of the demand for television receiver chas-is.

13. The Company has had experience with the public's reaction to and lack of acceptance of short-wave adapters and FM adapters, gadgets which were marketed in an attempt to give the standard radio sets these additional receptions. The Company has found that the American housewife would not have her furniture altered by these additions. The Company has been totally unable to market this type of equipment.

14. The development of a widely accepted television industry; the phenomonal growth in the use of television receivers, in the quality of television broadcasting and receiving the great increase in the amount of money spent on advertising in this industry, all have been bottomed on the fact that the industry could make investments in and spend money upon the manufacture of sets with the assurance that [fol. 830] the standards for television receivers had been firmly established as a result of extended hearings before the Federal Communications Commission prior to 1941 and by the continued manufacture of sets pursuant to the standards as promulgated by the Commission in 1941.

15. This was the situation at the time the order complained of herein was entered by the Federal Communications Commission.

16. The Standard television broadcast of today as established by the FCC standards is a broadcast of 30 still pictures a second with each picture having 525 lines. The CBS proposed color television broadcast would be a broadcast of 24 still pictures a second, each having 405 lines. Every set manufactured by The Radio Craftsmen Incorporated, and every set manufactured by the industry today, is able to receive only the broadcast of 30 still pictures a second, containing 525 lines each. This means that if no additional work is done on the television receiver sets in the hands of the public and no additional money is expended, the television receivers in the hands of the public could not receive the CBS color television broadcasts in either black and white, or color. In order to permit of receiving the CBS color broadcasts in black and white, the present set would have to have placed in it what is called an "adapter". Estimates indicate this accessory if manufactured in quantity would retail at $40.00 to $50.00 plus installation costs, and after it has been put into the present television receiver, that receiver could still not get the color picture being broadcast by CBS. In order to get the CBS color picture an additional gadget would have to be purchased and put upon the television receiver. This gadget is sometimes referred to as "color converter" and consists [fol. 831] of a large wheel which is placed in front of the television receiver and while spins during the reception of the color broadcast at 1440 revolutions per minute plus a motor necessary to spin the color wheel and synchronize the equipment. Estimates indicate that this gadget can be manufactured in quantity at $100.00 to $200.00. Thus only by an additional expenditure of aproximately $200.00, which is more than the present retail price of many black and white television receiver sets which deliver equal picture size, can the television receiver sets which are now in everyone's home be adapted to receive the CBS color picture. But even when this is done the picture received is not of the same high fidelity and definition which it is now possible to receive on standard black and white receivers and such degradation cannot be corrected as long as the broadcast is one of 24 still pictures, a second, containing 405 lines.

17. Even after the expenditure of these sums for adapters and converters, set owner will receive a picture which is degraded, has a higher flicker content, and is limited to a picture of 10 inches to 12½ inches in diameter as compared to the 16 inch or larger picture which he now is accustomed to receive.

18. On the other hand, there are in process of development, compatible color television systems that will broadcast color television with 525 lines per picture and 30 pictures per second.

The color broadcast of such systems will serve all 8 to 10 million owners with television pictures in black and white and also serve owners of new color television receivers with pictures in color.

Such pictures received in either black and white or color will be 16 inch, 20 inch or 24 inch in diameter, of fine defini- [fol. 832] tion without annoying flicker and provide a 25 to 40 million viewing audience to justify the advertising expense for good programs and finally, to make color television an added form of home entertainment.

The result is that the present television receiver owners will not be required to make additional expenditures and will not be afraid of set obsolescence.

19. The Radio Craftsmen Incorporated, is a member of the Radio and Television Manufacturers Association, formerly the Radio Manufacturers Association, which was made a party by the Commission to its hearings.

20. Since the adoption of the order of the Commission of October 10, 1950, various statements and broadcasts have been made by CBS and its employes which in effect informed the public that it would be undesirable for the public to purchase a standard black and white television receiver for a period of at least six months.

21. As a result of the action of the Commission in promulgating its order of October 10, 1950, and as a result of such commentaries on the order by persons, informed and uninformed, orders for the purchase of standard black and white television receiver sets have fallen off considerably. Orders for sets in the future have decreased with the result that The Radio Craftsmen Incorporated has and will suffer substantial financial loss.

22. The effect of the order complained of is to impair the existing market for black and white television receivers to

the irreparable injury of The Radio Craftsmen Incorporated.

[fol. 833] 23. The effect of the order is to authorize the commercial broadcast of CBS color programs to the exclusion of other color programs and other color television standards with the result that the customers of The Radio Craftsmen Incorporated, will not be able to receive such color broadcast programs, even in black and white, without great additional expense and inconvenience of operation. This in turn results in destroying the reputation that the Radio Craftsmen Incorporated has built up over a period of years in the radio and television receiver field.

24. The effect of the order of the Commission is to deprive the Radio Craftsmen Incorporated, of income which was assured prior to the order of the Commission.

25. The Commission's order is illegal and void and beyond the power authority and jurisdiction of the Commission for the following reasons:

A. The order deprives the Radio Craftsmen Incorporated of property without the process of law, contrary to the Fifth Amendment of the Constitution of the United States.

B. The order of the Commission is arbitrary and capricious and results from the failure of the industry to comply with conditions imposed by the Commission which were illegal and beyond its authority to impose.

C. The order is unsupported by substantial evidence.

D. The substantial evidence produced by the industry as a whole demonstrates that the system which the order of the Commission seeks to authorize is detrimental to the best interests of the public and of the advance of television broadcasting.

[fol. 834] E. The order is contrary to the public interest, convenience and necessity.

F. The order violates Section 303 (g) of the Communications Act of 1934.

G. The order is contrary to the terms of the Commission's notice of July 11, 1949.

26. The intervening complainant has no adequate remedy at law.

Wherefore:

1. Intervenor prays that the specifically constituted Court of three judges convened to hear this matter issue a temporary interlocutory injunction herein restraining, enjoining and suspending until further order of this Court, the promulgation, operation and execution of the order of October 10, 1950 of the Federal Communications Commission.

2. That after final hearing this Court order, adjudge and decree that said order of the FCC is beyond the lawful authority of the Commission, is in violation of the legal rights of the intervenor, and is wholly void, arbitrary and unreasonable and that its promulgation and operation be perpetually enjoined so that it be vacated and set aside.

3. The the intervenor have such other and further relief in the premises as is equitable and just and as may be deemed by this Court to be adequate and proper.

The Radio Craftsmen, Incorporated, an Illinois Corporation. By: John H. Cashman, President.

Kelly, Kelly & Kelly. By: John J. Kelly, Attorneys for Intervenor, 111 W. Washington St.

[fols. 834a-835] *Duly sworn to by John H. Cashman. Jurat omitted in printing.*

[fol. 836] In United States District Court

[Title omitted]

Notice—Filed November 14, 1950

To: Arvey, Hodes and Mantynband, One North La Salle Street, Chicago, Illinois.

Kirkland, Fleming, Green, Martin & Ellis, 33 North La Salle Street, Chicago, Illinois.

Otto Kerner, Jr., United States Attorney for the Northern District of Illinois, U. S. Courthouse, Chicago, Illinois.

Hon. J. Howard McGrath, Attorney General of United States, Washington, D. C.

Benedict P. Cottone, Esq., General Counsel Federal Communications Commission, Washington, D. C.

Please take notice, that on Tuesday, November 14, 1950, at the hour of 10:30 A.M., or as soon thereafter as counsel

can be heard, we shall appear before Judges Major, Sullivan and La Buy, in the room usually occupied by Judge Sullivan as a court room in the Federal Courts Building, Chicago, and thereupon present and file the motion to intervene and pleading in intervention on behalf of Emerson Radio & Phonograph Corp., copies of which motion to intervene and pleading in intervention and the order entered by Judge Philip L. Sullivan on November 10, 1950, abbreviating the time for service of said motion, are hereto attached and made a part of this notice.

At which time and place you may appear if you see fit.

Nash, Ahern & McNally, Attorneys for Emerson Radio & Phonograph Corp., Applicant for Intervention. Martin J. McNally.

[fol. 837] Received this 10th day of November, 1950, a copy of foregoing Notice, motion to intervene, pleading in intervention and order.

Arvey Hodes & Mantynband, One North La Salle St., Chicago, Ill., Attorneys for Columbia Broadcasting System, Inc., Defendant-Intervenor.

Kirkland, Fleming, Green, Martin & Ellis, 33 North La Salle St., Chicago, Illinois, Attorneys for Plaintiffs.

Otto Kerner, Jr., United States Attorney for the Northern District of Illinois, U. S. Court House, Chicago, Illinois.

[fol. 838] UNITED STATES DISTRICT COURT

[Title omitted]

MOTION TO INTERVENE—Filed November 14, 1950

Emerson Radio & Phonograph Corp., a Corporation, by Nash, Ahern & McNally, its attorneys, and Paul, Weiss, Rifkind, Wharton & Garrison, of counsel, moves for leave to intervene and be heard as a party plaintiff in this action on the following grounds:

(a) that it is engaged in the sale and distribution of television receivers;

(b) that it is affected by the order of the defendant, Federal Communications Commission, setting standards for the commercialization of color television;

(c) that it is interested in this action pursuant to the provisions of the Communications Act of 1934, as amended, 47 U. S. C. Sec. 402 (a) and 28 U. S. C. Sec. 2323; and

(d) that its interest and the main action raise common questions of law and fact.

A copy of applicant's pleading in intervention is attached hereto.

Nash, Ahern & McNally. By: Martin J. McNally (a Member of said Firm), Attorneys for Emerson Radio & Phonograph Corp., 111 W. Washington St., Chicago 2, Illinois.

Of Counsel:

Paul, Weiss, Rifkind, Wharton & Garrison, 61 Broadway, New York 6, N. Y.

[fol. 838a] [File endorsement omitted]

[fol. 839] STATE OF ILLINOIS,
County of Cook, ss:

Martin Kleinbard, being first duly sworn on oath, deposes and says, that he served the foregoing notice upon each of Hon. J. Howard McGrath, Attorney General of the United States, Washington, D. C., and Benedict P. Cottone, Esq., General Counsel for Federal Communications Commission, Washington, D. C., named in said notice, as parties to receive said notice, by mailing, Registered Mail, return receipt requested, in the United States Post Office, located in the State of Illinois Building, 160 North La Salle Street, Chicago, Illinois, on the 10th day of November, 1950 at 4:45 o'clock P.M., two (2) envelopes, each one of such envelopes containing a true and correct copy of the said notice, together with a copy of motion to intervene, pleading in intervention and order, therein referred to, and addressed to one of the foregoing parties, respectively, named in the said notice, at his respective address, as shown by said notice; that upon each of the said envelopes, there was placed the proper amount of United States postage stamps; that upon each of the said envelopes there was the return address

of Nash, Ahern & McNally, 111 West Washington Street, Chicago 2, Illinois.

Martin Kleinbard.

Subscribed and sworn to before me this 10th day of November, A.D. 1950. Nina Hulbert, Notary Public. (Seal.)

[fol. 839a] [File endorsement omitted]

[fol. 840] UNITED STATES DISTRICT COURT

[Title omitted]

Pleading in intervention—Filed November 14, 1950

Emerson Radio & Phonograph Corp. applicant-intervenor herein, for its pleading in intervention, alleges:

FIRST: That it is a corporation duly organized and existing under the laws of the State of New York.

SECOND: That it is engaged, among other things, in the business of manufacturing, selling and distributing television receivers to the public.

THIRD: That over one-half a million of its television receivers are presently in use by the public and that this number is being constantly increased by a sales volume of approximately 40,000 per month.

FOURTH: That the Federal Communications Commission (hereinafter referred to as "the Commission") is an administrative tribunal created by the Communications Act of 1934 and is charged by said Act, among other things, with the regulation of transmission by radio of writings, signs, signals, pictures and sounds of all kinds, including all instrumentalities, apparatus and services incidental to such transmission.

FIFTH: That all television receivers manufactured by [fol. 841] the applicant for intervention herein are usable and salable only insofar as they are capable of receiving television broadcasts transmitted in accordance with the rules and regulations and engineering standards promulgated by the Commission pursuant to the aforementioned statutory authority.

SIXTH: That, therefore, the applicant for intervention

herein has a deep concern and interest in, and will be seriously affected by, any rules, regulations and standards promulgated by the Commission.

SEVENTH: That on July 11, 1949 the Commission issued a "Notice of Further Proposed Rule Making" with respect to amendment of §3.606 of the Commission's Rules & Regulations, amendment of the Commission's Rules, Regulation & Engineering Standards concerning the television broadcasting service.

EIGHTH: That in said notice the Commission proposed, among other things, to consider changes in transmission standards looking toward the commercialization of a color television system on a showing that such a system could operate in a six megacycle channel and that the transmissions of such a system would be receivable on existing television sets by making relatively minor modifications to such sets.

NINTH: That pursuant to said notice and amendments thereto, during the period between September 26, 1949 and May 26, 1950 hearings and field tests were conducted by the full Commission with respect to three color television systems—those proposed by Radio Corporation of America (hereinafter referred to as "the RCA system"), by Columbia Broadcasting System, Inc. (hereinafter referred to as "the CBS system") and by Color Television Incorporated.

[fol. 842] TENTH: That during the course of these hearings and on February 16, 1950, the applicant for intervention herein petitioned the Commission for leave to intervene in the Commission's proceedings to present its views on the proper development of color television and the problems faced by the manufacturers of television receivers, and its suggestions as to the color television system to be adopted by the Commission in the public interest.

ELEVENTH: That by letter dated February 21, 1950 the Commission denied said petition on the grounds that the testimony proposed related to policy rather than to scientific matters, and that the proceedings were advanced too far to warrant intervention for that purpose.

TWELFTH: That by reason of said denial and despite the applicant's deep interest hereinabove set forth, it has been refused all opportunity to express its views and to be

heard by the Commission on the transmission standards which will govern the broadcasting of color television.

THIRTEENTH: That thereafter and on October 10, 1950 the Commission issued its Order in the above described proceedings promulgating standards for the commercialization of color television.

FOURTEENTH: That the effect of the standards promulgated by said Order is to authorize the commercial broadcasting of color television by the CBS system and to exclude the commercial broadcasting of color programs by either of the other two systems or by any other system which does not comply with the standards promulgated by the Commission.

FIFTEENTH: That the CBS system as adopted is seriously defective in that it has certain limitations which appear to be inherent in the system and which gravely impair the present value and future potential of color [fol. 843] television to the public. The most important of said limitations are:

A. The CBS system has less geometric resolution than the present monochrome system. By "less geometric resolutions" is meant that the pictures broadcast by the CBS system have fewer picture elements (actually over 50% fewer) than pictures broadcast by the present monochrome system and hence lack the clarity and detail which the public has come to expect from television pictures.

B. The CBS system, as a practical matter for the present, is limited to projection receivers or to direct view tubes of 12-1/2 inches or smaller in size. This limitation is caused by the fact that the CBS system uses a color filter in the form of a color wheel whose diameter must be twice that of the tube with which it is used. Projection receivers have not had any widespread public acceptance and the trend toward larger sized direct view receivers is so marked that by the end of the year 1950 the applicant will have ceased general production of any model using tubes under 16 inches in size.

C. The CBS system is incompatible. "Incompatible" is used here to express the notion that the CBS system broadcasts are transmitted on a different standard of lines and fields per second than the present monochrome transmissions, and will not be receivable in black and white

pictures by presently existing black and white receivers unless such receivers are extensively modified at substantial cost.

SIXTEENTH: That the continuance of the public's reception of television as a major medium of entertainment and information is dependent on the production of television receivers capable of satisfactory performance which can be purchased with confidence that such receivers will [fol. 844] provide complete television service for a reasonable number of years without the necessity for extensive and expensive modification.

SEVENTEENTH: That television receivers manufactured to transmit a color television system suffering from the aforementioned limitations will not be capable of satisfactory performance and cannot be purchased with assurance that they will provide complete television service for a reasonable number of years without the necessity for extensive and expensive modification.

EIGHTEENTH: That the Commission's decision adopting and crystallizing a color television system suffering from the aforementioned limitations has already caused confusion in the public's mind and has already caused a sharp decline in the public's demand for television receivers as reflected in the over 60% reduction in the applicant's backlog of unfilled orders since the issuance of said Order.

NINETEENTH: That by virtue of the foregoing, said Order has damaged and will continue to damage the applicant's business, business reputation and goodwill.

TWENTIETH: That said Order not only adopted and crystallized a color television system suffering from the aforementioned limitations but also, by its nature, has excluded and shut out the development of other systems of color television not subject to the aforementioned limitations. One such system presented to the Commission is the RCA all electronic, high definition, compatible system. [fol. 845] Twenty-First: That said Order, insofar as it excludes, prevents and obstructs the exploitation and development of the RCA and other all-electronic, high definition, compatible systems, and grants a preferred position to the limited and incompatible CBS system, is contrary to the declared policy and statutory requirements of the Com-

munications Act of 1934, and is illegal and void for the following reasons, among others:

A. The Communications Act of 1934 directs the Commission to exercise its authority in accordance with the statutory standard of public interest, convenience and necessity. Section 303(g) of the Communications Act specifically directs the Commission to exercise its authority so as to "encourage the larger and more effective use of radio in the public interest". It is clear that the Commission's action, insofar as it obstructs and stifles the exploitation and development of high-definition, compatible systems of color television, and freezes the art under the limitations of the CBS system as described above, is in conflict with the statutory standard under which the Commission is required to act.

B. The Communications Act of 1934, as the Supreme Court of the United States has declared, recognizes that the field of broadcasting is one of free competition. Sections 311, 313 and 314 of the Communications Act specifically make the provisions of the Sherman Act applicable to broadcasting. The Commission itself, in its Report on Chain Broadcasting (and in many other pronouncements) has declared that "radio broadcasting is a competitive industry. The Congress has so declared in the Communications Act of 1934, and has required the fullest measure of competition possible within physical limitations". It is apparent that the Commission's order here in question, insofar as it grants to the CBS system an exclusive and [fol. 846] monopolistic opportunity, and excludes the RCA and other all-electronic systems from equal opportunity to develop and exploit such systems, is directly contrary to the policy and mandate of the Communications Act respecting the maintenance and preservation of competition in broadcasting. As the Chairman of the Committee on Interstate and Foreign Commerce of the United States Senate declared in a letter to the Chairman of the Commission, dated November 12, 1949, the public interest requires that the standards for color television adopted by the Commission be such "that this essential improvement may be developed naturally in the traditional American, free enterprise, non-monopolistic manner".

Twenty-Second: That the record of the hearings demonstrates on its face that the Commission's rejection of the RCA system was based upon insufficient information and incomplete understanding.

Twenty-Third: That the record of the hearings demonstrates on its face the remarkable forward steps taken by the RCA system towards satisfactory color production during the comparatively short period of hearings, and the RCA petition of October 4, 1950 to the Commission asking the Commission to refrain from setting any standards until June, 1951 speaks of even further improvements already achieved, and a completely developed commercially suitable system by June, 1951.

Twenty-Fourth: That the record of the hearings demonstrates on its face that the decision to adopt the CBS system was dependent to no small extent on the Commission's anticipation that the tri-phosphors color tube, when developed, would replace the color wheel in the CBS system and thus obviate the size limitation. The development of said tube would at the same time obviate all the major [fol. 847] faults which the Commission found in the RCA system as demonstrated to it.

Wherefore, the applicant for intervention herein, prays for judgment enjoining, setting aside, annulling and suspending permanently the promulgation, operation and execution of said Order of the Commission insofar as it purports to prevent the commercial development and exploitation of the RCA system on an equal basis with the development and exploitation of the CBS system, or, in the alternative, for judgment enjoining, setting aside, annulling and suspending, temporarily, the promulgation, operation and execution of said Order of the Commission for nine months, and requiring the Commission in the interim to reopen the record and permit RCA to testify further on its system, to permit the applicant to present its viewpoint as a manufacturer to the Commission, and to permit the Commission to inform itself more thoroughly on the RCA system.

Emerson Radio & Phonograph Corp., Applicant-Intervenor,

Nash, Ahern & McNally, by: Martin J. McNally (A Member of said Firm).

Attorneys for Emerson Radio & Phonograph Corp., 111 W. Washington St., Chicago, Ill.

Of Counsel:

Paul, Weiss, Rifkin, Wharton & Garrison, by: Martin Kleinbard, 61 Broadway, New York 6, N. Y.

Duly sworn to by Benjamin Abrams. Jurat omitted in printing.

[fol. 847a-848] [File Endorsement Omitted].

[fol. 849] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

NOTICE—Filed November 14, 1950

To:

The Honorable John Howard McGrath, Attorney General of the United States of America, Department of Justice, Washington, D. C.

Federal Communications Commission, Washington, D. C.

Honorable Otto Kerner, Jr., United States Attorney for the Northern District of Illinois, U.S. Court House, Chicago, Illinois.

Mr. Weymouth Kirkland and Kirkland, Fleming, Green, Martin & Ellis, Attorneys for Plaintiffs, 33 North LaSalle Street, Chicago, Illinois.

Shapiro and Schiff, Attorneys for Pilot Radio Corporation, 38 S. Dearborn Street, Chicago, Illinois.

Arvey, Hodes and Mantynband, Attorneys for Columbia Broadcasting System, Inc., 1 N. LaSalle Street, Chicago, Illinois.

Righeimer and Righeimer, Attorneys for Wells-Gardner & Co., 135 S. LaSalle Street, Chicago, Illinois.

Schradzke and Gould, Attorneys for Television Installation Service Association, 33 N. LaSalle Street, Chicago, Illinois.

[fol. 850] Please Take Notice that on Tuesday, the 14th day of November, 1950, at the hour of 10:00 o'clock in the fore-

noon, or as soon thereafter as counsel may be heard, we shall appear before the Honorable Philip L. Sullivan, United States District Judge, at his Courtroom in the United States Court House, 225 S. Clark Street, Chicago, Illinois, or before such other judge of said court as may be hearing matters in his place and stead and shall at said time and place present the motion of Local 1031, International Brotherhood of Electrical Workers, AFL, an unincorporated labor union, to intervene as a Plaintiff in the above-entitled cause, a copy of said motion, together with a copy of the proposed complaint of said union, being herewith served upon you, and shall move for the entry of an Order granting said motion to intervene and other relief, at which time and place you may appear if you so see fit.

Joseph M. Jacobs, Alfred Kamin.

Jacobs and Kamin, Attorneys for Applicant for Intervention, Local 1031, International Brotherhood of Electrical Workers, AFL.

Jacobs and Kamin, 201 N. Wells Street, Chicago 6. Illinois, Franklin 2-1646.

Jurat attached but not copied.

[fol. 851] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

MOTION TO INTERVENE AS A PLAINTIFF—FILED NOVEMBER 14, 1950

To the Judges of the District Court of the United States, for the Northern District of Illinois, Eastern Division:

Local 1031, International Brotherhood of Electrical Workers, AFL, an unincorporated labor union, hereinafter referred to as "Local 1031," by Joseph M. Jacobs and Alfred Kamin, its attorneys, moves to intervene as a plaintiff in the above-entitled cause on the following grounds:

1. This applicant for intervention, is an unincorporated labor organization which represents persons employed by

various manufacturers of radio and television receivers, parts and equipment therefor and allied products.

2. Local 1031 has in excess of 21,000 members, most of whom are directly employed in the manufacture of television receivers and parts and equipment for such sets.

3. Under the provisions of the National Labor Relations Act (29 U.S.C. Pars. 151, et seq.), Local 1031 has been designated by a majority of the employees in the plants wherein its members are employed as sole and exclusive bargaining representative in all matters relating to rates of pay, hours of work, seniority rights, job security and other conditions of employment. The names and locations of such employers and the number of their employees represented by Local 1031 are set forth in greater detail in its proposed complaint attached thereto.

[fol. 852] 4. As statutory bargaining representative, this applicant has negotiated with many employers engaged in the manufacture of television receivers, and parts and equipment used therefor, currently effective collective bargaining agreements.

5. In its capacity as statutory representative of these employees, the applicant is the principal spokesman in their behalf in all matters directly or indirectly affecting their job tenure, the employment opportunities and their actual earnings through available employment in occupations relating to the manufacture of television receivers, and parts and equipment therefor in the labor market area of Chicago, Illinois, and its environs.

6. The above-entitled cause was commenced in this Court on the 17th day of October, 1950, by the filing of a complaint seeking injunctive and declaratory relief, pursuant to various statutes of the United States, from the promulgation, operation and execution of an Order of the Federal Communications Commission theretofore entered.

7. Local 1031 has a direct and substantial interest in the issues of the above-entitled action and in the determination thereof.

8. Employees of various television receiver manufacturers and of manufacturers of parts and equipment for such receivers, represented by Local 1031 and members of Local 1031, seeking employment with such manufacturers, have already been adversely affected in their employment prospects by the Order of the Federal Communications Commission complained of and will suffer irremediable economic

loss, through substantial curtailment of earnings and employment opportunities unless said Order is enjoined and annulled, all as more fully set forth in applicant's proposed complaint, a copy of which is hereto attached.

9. The representation of the applicant's interests, in behalf of employees it serves as statutory collective bargaining representative, by the existing parties to this proceeding is or may be inadequate.

10. By various statutes of the United States and under the Rules of Civil Procedure for the District Courts of the [fol. 853] United States, there is conferred upon the applicant the right to intervene as a party plaintiff herein. See 47 U.S.C. 402 (a); 28 U.S.C. 2323; Rule 17 (b); Rule 24.

11. It will appear to the Court from the applicant's proposed complaint attached hereto that the applicant's claim and the main action have a common question of law and fact so that the intervention of the applicant will neither delay nor prejudice the adjudication of the issues arising in the main action.

Wherefore, the applicant prays for the entry of an order herein granting this application for leave to intervene as a party plaintiff, accepting as filed the proposed complaint hereto attached, granting leave to this applicant to adopt as its own, as an additional party thereto, the plaintiff's motion for a temporary injunction and other relief, heretofore filed on the 30th day of October, 1950, and fixing such other terms of intervention by this applicant as to the Court shall seem meet.

Local 1031, International Brotherhood of Electrical Workers, AFL, an unincorporated labor union. By M. F. Darling, President and Business Manager.

Joseph M. Jacobs, Alfred Kamin. Jacobs and Kamin, Attorneys for Applicant for Intervention. 201 No. Wells St., Chicago 6, Illinois. Franklin 2-1646.

Duly sworn to by M. F. Darling. Jurat omitted in printing.

[fol. 854] IN THE UNITED STATES DISTRICT COURT

COMPLAINT OF INTERVENOR—Filed November 14, 1950

Local 1031, International Brotherhood of Electrical Workers, AFL, an unincorporated labor union, hereinafter referred to as "Local 1031", leave of court being first had and obtained, intervenes in the above-entitled cause and for its complaint herein alleges:

1. Local 1031 adopts all allegations in the Complaint in the above-entitled cause heretofore filed by Radio Corporation of America, National Broadcasting Company, Inc., and RCA Victor Distributing Corporation, plaintiffs, as its own, except those paragraphs thereof which relate peculiarly to the operations of said plaintiffs.

2. The paragraphs of said Complaint not adopted by Local 1031 are numbered as follows: 2, 3, 4, 7, 8, 9, 10, 11, 17, 20, 21, 78, 79, 80, and 81.

3. The Intervenor Plaintiff is a voluntary unincorporated labor organization. Its headquarters are in Chicago, Illinois.

4. Local 1031 has a good standing membership in excess of 21,000 persons. All of its members are employed in the manufacture of radio, television and electrical products, parts, equipment and sets, in and around the cities of Chicago and Bloomington, in the State of Illinois.

5. Under the terms of the National Labor Relations Act (29 U.S.C. 151 et seq.) and pursuant to representation elections conducted by the National Labor Relations Board thereunder, Local 1031 has been duly certified as statutory representative of the production and maintenance employees of many establishments engaged in the manufacture of television receivers or parts or supplies therefor.

6. Among the more sizeable establishments largely engaged in the manufacture of television sets, parts or equipment, in the Chicago or Bloomington labor market areas, whose hourly-paid production and maintenance employees are represented by Local 1031, are Admiral Corporation, which has 3 plants and approximately four thousand employees; Wells-Gardner & Co., employing about nine hun- [fol. 855] dred persons; Jefferson Electric Company, employing thirteen hundred persons; Rauland Corporation, with eight hundred employees; Oak Manufacturing Company, employing about nine hundred men and women;

Standard Transformer Corporation, employing approximately six hundred, and American Phenolic Company, with eight hundred employees. These employment figures relate only to men and women engaged in the actual production of television receivers, or receiving tubes, coils, transformers, condensers, antennas, speakers, or other necessary parts of such receivers, and do not include employees of such companies not represented by Local 1031, such as executives, supervisors, guards, office and clerical employees, and other employees.

7. Not less than eighteen thousand men and women who are members of Local 1031 are employed by manufacturers of television receivers and makers of television parts and equipment.

8. The total average aggregate annual earnings for the past year of such members of Local 1031 as are employed by such manufacturers is in the neighborhood of fifty million dollars ($50,000,000.00).

9. With the current trends toward negotiation between employers and labor organizations of yet higher wages than prevailed during the first ten months of the year 1950, if the relief herein sought is granted, the aggregate annual earnings of such employee-members will substantially exceed the sum of fifty million dollars ($50,000,000.00) during the year of 1951.

10. Local 1031 is concerned not only with the establishment of equitable rates of pay for its members through collective bargaining with their employers, but is charged with primary responsibility for protecting the job security and work opportunities of such members.

11. Members of Local 1031 rely upon their Union to refer them to jobs in the radio and television industry in and around Chicago and Bloomington when they are laid off from regular employment.

12. The members of Local 1031 depend largely upon their Union to establish for them security in their jobs by the creation and enforcement of seniority rights in the collective labor agreements negotiated with their employers, and by the formulation of sound programs between their Union and their Employers to aid the industry as a whole to grow and prosper.

13. The men and women employed in the radio and television industry in the Chicago and other market areas are in high degree possessed of peculiar skills and knowledge

which are adapted to the special requirements of such industry and which are not necessarily utilizable in other trades or occupations.

14. The members of Local 1031 have entered the ranks of employment in the radio and television industry upon the fair assumptions that employment in such industry [fol. 856] will be relatively stable, that the future of such industry will be secure and that government agencies having control, direct or indirect, of such industry, would indulge in no arbitrary or capricious action which would violently disturb the properly anticipated security and future of their jobs.

15. Members of Local 1031 and the hourly-paid production and maintenance employees of other manufacturers of television receivers and parts for such receivers have a direct, substantial and immediate interest in the Order of the Federal Communications Commission complained of, which was brutally ignored by the Commission in the proceedings before it.

16. The Federal Communications Commission Order of October 10, 1950, does not embody a realistic, orderly and practical program to improve the standards of television broadcasting and reception. On the contrary, the Order is an ill-considered improvisation, certain to cause violent dislocations not only in the broadcasting industry, but in the manufacture and sale of TV receivers and equipment, with attendant disruption of the continuity of employment of the thousands of workers, including the members of Local 1031, now engaged in the manufacture of such equipment.

17. Members of Local 1031 did not have long to wait before they heard and felt the impact on the industry, to which their economic futures are inextricably bound, of the Commission's Order of October 10, 1950. On October 15, 1950, Frank Stanton, the President of the Columbia Broadcasting System, in an apparent flush of triumph over the CBS victory in the FCC proceedings used the facilities of CBS to advise potential buyers of television receivers to refrain from making purchases of receivers "until you will have a self-contained set with built-in compatibility and built-in color".

18. On October 22, 1950, Mr. Stanton publicly declared that the owners of millions of television receivers will have a "compatibility" problem in their efforts to convert

and adapt such receivers to the reception of Commission-sanctioned color broadcasts.

19. The FCC Order and Mr. Stanton's public exhortations to refrain from buying present model television receivers have already resulted in an abrupt leveling off of employment in the manufacturing of television receivers and parts and the cancellation of television receiver orders with manufacturers employing members of Local 1031. Prior to October 10 the industry was increasing its work force at a regular rate.

20. Violent overturn in the industry, and a complete loss of public confidence in the purchase of any television receivers at all has been averted only by the vigorous counter-offensive of the original plaintiffs in this action.

21. The officers and members of Local 1031 do not pretend to be engineering experts, and have no opinions or conjectures to offer concerning the technical problems in-[fol. 857] volved in comparisons between the proposed color television broadcasting techniques of CBS, NBC, CTI or other parties who participated in the proceedings before the Commission.

22. However, as people who spend their days in the manufacturing of television parts and in the assembling of these parts into receivers, as men and women who themselves own and use television receivers, the members of Local 1031 know that inevitably there can be no "compatibility" between the CBS color system and the black and white television receivers now in the homes of America or being presently offered for sale or manufactured.

23. "Compatibility" may be a word of art to the engineers who testify at FCC hearings. Members of Local 1031 will accept the New Century Dictionary definition of "compatible" as "capable of existing together in harmony; consistent; congruous".

24. On the basis of this definition, the members of Local 1031 advise this Court that FCC claims of "compatibility" between existing receivers and the proposed method of color broadcasting contained in its Order are just chimerical assumptions. As workers in the industry and as set owners themselves, the members assert:

a. Small picture receivers (12 inches and under) are already regarded by the public as obsolete. The novelty of merely seeing a picture, any kind of picture, any size, in

your own home is no longer what sells TV sets. The public wants bigger and clearer pictures. Small sets are a drug on the market today. Merely adding color will not make the public satisfied with a small picture. Magnifiers proved to be a joke on the smaller sets. You had to have a head-on view through a magnifier or you saw a distorted picture. It seems weird that the FCC which is supposed to know so much about television should be seriously speaking about "magnified" pictures. Most of us now own 16 or 19-inch sets. However low the cost might be, we would see no point in going through the bother of converting and adapting our 16 to 19-inch sets to get a picture of 12 inches, even if the picture is in color. It is almost like CBS proclaiming wonderful high fidelity long-playing phonograph records which can be played only on an old fashioned victrola with its non-electrical, needle-contact horn!

b. The FCC figures for converting and adapting a 7-inch set for color have no application to the facts of life. Nobody is buying 7-inch sets now, and certainly nobody of common sense will spend $95.00 to $130.00 to convert and adapt a 7-incher today worth not over $25.00, for color reception (even if it could be done as cheaply as FCC claims). Nor, will anybody spend $110.00 to $170.00 to convert a 10 or 12-inch set for color. Indeed they wouldn't spend that much money now on an original new set in that size.

c. But even if the public would accept a smaller picture in [fol. 858] color and felt that the advantage of color reception would justify the outlay of converting and adapting costs, whether at the figures set by FCC or the higher figures estimated by other manufacturers, are the mechanics of adaptation and conversion proposed by CBS "capable of existing together in harmony" with present model black and white television receivers, whether in American homes, show-rooms, factory warehouses or on the assembly line? FCC itself admits "existing receivers with doors or recessed tubes would, in practice, be difficult to convert". What is a householder supposed to do with the doors on his television set? Chop them off? But even if he has no problem of doors or recessed tubes, and his other objections are overcome, he must install in his household a Rube-goldbergian device of such character and size that no industrial designer, however talented, could make "compatible" with the mood and furnishings of the ordinary family hab-

itat. (All of the above references are to FCC conjectures which may be found in Exhibit B, annexed to the original complaint, pages B 68-69, and B 71-72.)

The members of Local 1031, with their long experience in the radio and television industry, have seen their employers get stuck with many adapters of various types before. They feel that the same future would be found in public reaction to attempted conversion of existing receivers solely for purposes of receiving CBS color system broadcasts.

25. The inevitable consequence of the FCC Order herein complained of will be to discourage mass buying of television receivers in the character and form in which they are now being manufactured, until such time as the confusion engendered by the Order of October 10, 1950 has been dissipated. It will mean widespread conversion and retooling and marketing problems of great variety for their employers. Indeed there would likely be two such periods of conversion and retooling, the first to make effective the FCC Order and the second after the FCC renders a new Order to rectify the patent errors of its first sanctioned experiment in color broadcasting. The agency Order complained of herein will inevitably induce large-scale unemployment and diminution of earnings to the members of Local 1031, and other hourly-paid wage earners similarly situated throughout the nation.

26. Local 1031 and its members are, of course, not opposed to orderly progress and technological advancement in the industry in which they are employed; but they respectfully submit that the Order of October 10 of the FCC is not a forward step in the interests of the television industry or in the interests of the public.

27. Broadcasting companies; television receiver manufacturers and companies engaged in the production of parts and equipment used in the industry always have the opportunity, or at least the hope, of securing profitable adjustments at some future time for any business losses which they might sustain because of the ineptitude or callousness [fol. 859] of governmental agency action such as the FCC now proposes. But the wage earners represented by Local 1031 will have no such recoupment opportunities. Their sole income is derived from their hourly earnings as employees in an industry in which they have sought and in which they merit reasonable stability, job security, and

income prospects. The loss of employment to the members of Local 1031 and their loss of earnings through layoffs and reduced hours of work, which would result directly from condonation of the FCC proceedings herein complained of, will be irreparable.

28. For the reasons set forth in paragraph 75 of the complaint of Radio Corporation of America, National Broadcasting Co., Inc. and RCA Victor Distributing Corporation, plaintiffs, heretofore filed in the above-entitled cause, the Commission's Order is illegal, void, and beyond its power, authority and jurisdiction.

29. Additionally, this intervenor plaintiff submits that this cause should be taken by the Court as an appropriate review of final agency action under the Administrative Procedure Act, (5 USC 1001, et seq.). Accordingly this Court should hold unlawful and set aside the Order of the FCC of October 10, 1950, herein complained of and the findings and conclusions in support thereof, on the grounds that such Order, findings and conclusions are

(a) arbitrary and capricious, and an abuse of discretion, or otherwise not in accordance with the law;

(b) contrary to constitutional right, power, privilege or immunity;

(c) in excess of statutory jurisdiction, authority or limitation, or short of statutory right;

(d) without observance of procedure required by law;

(e) unsupported by substantial evidence, or

(f) unwarranted by the facts to the extent that the facts are subject to trial *de novo* by this Court.

30. This Intervenor Plaintiff in behalf of the employee members it represents has no adequate remedy at law.

This Intervenor Plaintiff prays for the following relief:

1. The specifically constituted court of 3 judges, convened to hear this matter, issue an interlocutory injunction herein, restraining and enjoining and suspending until further Order of this Court, the promulgation, operation and execution of the Order of October 10, 1950 of the Federal Communications Commission. And in aid of this prayer for relief, this Intervenor Plaintiff adopts as its own the motion herein filed by the original plaintiffs for such interlocutory injunction.

2. After final hearing this Court shall order, adjudge and decree that said Order of the FCC is beyond its legal authority, is in violation of the legal rights of this Intervenor Plaintiff and the members whom it represents, and is wholly void, arbitrary and unreasonable and that its promulgation, operation and execution be perpetually restrained and enjoined.

[fol. 860] 3. The Intervenor Plaintiff may have such other and further relief in the premises as to equity and justice may appertain, and as may be deemed by this Court to be just and meet.

Local 1031, International Brotherhood of Electrical Workers, AFL, an unincorporated Labor Union, Intervenor; By M. F. Darling, President and Business Manager.

Jacobs and Kamin, By Joseph M. Jacobs, Alfred Kamin, Members of the Firm, Attorneys for Intervenor, 201 N. Wells St., Room 1524, Chicago 6, Illinois. Franklin 2-1646.

[fols. 861-862] *Duly sworn to by M. F. Darling. Jurat omitted in printing.*

[fols. 863-866] [File endorsement omitted]

IN THE UNITED STATES DISTRICT COURT

[Title omitted]

Affidavits of Plaintiffs—Filed November 9, 1950

[fol. 867] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

AFFIDAVIT OF C. B. JOLLIFFE

STATE OF NEW YORK,
County of New York, ss.:

C. B. JOLLIFFE, being duly sworn, deposes and says:

1. I am Executive Vice President in charge of the RCA Laboratories Division of the Radio Corporation of America (hereinafter called "RCA"), one of the plaintiffs herein.

2. I have read the Complaint, I am familiar with the facts there stated, and I hereby adopt the statements contained therein.

3. This affidavit is made in support of plaintiffs' motion for a temporary restraining order and a temporary or interlocutory injunction restraining, enjoining, and sus- [fol. 868] pending the promulgation, operation, and execution of the Order of the Federal Communications Commission (hereinafter sometimes called the "Commission"), adopted October 10, 1950, effective November 20, 1950, providing standards for the commercial broadcasting of color television. This affidavit is also made in opposition to motions to dismiss or for summary judgment filed by defendants and by intervenor Columbia Broadcasting System, Inc. (hereinafter called "CBS").

4. I am the holder of the degrees of Bachelor of Science and Master of Science from West Virginia University, and the degree of Doctor of Philosophy from Cornell University. I have been associated with RCA since 1935 and am a member of the Board of Directors of RCA, of National Broadcasting Company, Inc. (hereinafter called "NBC"), and RCA Communications, Inc. In addition to being Executive Vice President in Charge of the RCA Laboratories Division, I am also a member of the Committee on the RCA Victor Division, the management committee for the manufacturing division of RCA.

5. From 1922 to 1930 I was a research physicist of the Radio Section of the National Bureau of Standards of the Department of Commerce. The Department of Commerce had charge of the regulation of radio until the formation of the Federal Radio Commission in 1927. From 1930 to 1935 I was Chief Engineer of the Federal Radio Commission and its successor, the Federal Communications Commission. From 1922 to the present I have been familiar with the federal regulation of radio.

6. I have also served as Chief of the Electrical Communications Division of the National Defense Research Commission, as Secretary of the Industry Advisory Com- [fol. 869] mission, Board of War Communications, and as Chairman of the Allocations Panel of the Radio Technical Planning Board. I am a fellow of the American Association for the Advancement of Science, the American Insti-

tute of Electrical Engineers, the Institute of Radio Engineers and the Radio Club of America.

7. The purpose of this affidavit is to set forth the basic facts and established principles which show that the Order is contrary to the public interest and to set forth the necessary effect of the Order upon the industry and upon research and development.

Outline of Affidavit

8. The Order here complained of adopts standards for commercial color television broadcasting which fit only the CBS system. Although the Commission is limited in its actions by the statutory standard of the public interest, convenience and necessity, the 9,000,000 existing sets cannot receive anything from broadcasts on these new color standards.

9. Thus the Order on its effective date, November 20, 1950, will deprive the owners of these 9,000,000 receivers and the 35,000,000 people who enjoy television service of any picture whatsoever—whether in black and white or in color—from such transmissions on the CBS color standards adopted by the Commission as broadcasters may make.

10. The adoption of a television system such as the CBS system which cannot be received by existing receivers without substantial alteration—an incompatible system—is arbitrary and capricious. The Commission's Order is also [fol. 870] arbitrary and capricious in standardizing for the indefinite future upon an inferior color system with a severely limited improvement potential.

11. The Commission's Order is likewise arbitrary and capricious in its preclusive effect. It denies to the public commercial broadcasting in color on systems such as the RCA system. The RCA system can be received on existing receivers without any modification whatsoever as a high quality black and white picture. The RCA system is thus a fully compatible system.

12. For the Commission at this time to deny to the public commercial broadcasting of color television on such compatible system is arbitrary and capricious and beyond its jurisdiction. Such broadcasting cannot operate to the injury of the public and will afford the public an opportunity to decide for itself the relative merits of the competing color systems.

13. The two reports of the Commission on which the Order was issued are based expressly on engineering grounds. Of the seven-member Commission, only two have technical backgrounds. One of these two, formerly the Chief Engineer of the Commission, dissented from the final adoption of the Order.

14. The staff engineer who advised the Commission and took the most active role throughout the hearing on behalf of the Commission's technical staff and who is in charge of the Commission's laboratory which tested the various color systems had an interest of prestige and reputation in the adoption of the CBS system. This interest arose from the invention by him of an automatic switch usable with the CBS system but not with a compatible color system.

[fol. 871] 15. Although RCA objected, this engineer was allowed to continue in the proceedings and subsequently gave testimony favorable to the CBS system. Upon information and belief this staff engineer in the absence of the parties advised the Commission and participated in the formulation and preparation of the Order.

The Order

16. The Order (Exhibit H to the Complaint) amends the Commission's "Standards of Good Engineering Practice Concerning Television Broadcast Stations" so as to provide for the commercial broadcasting of color television in addition to the commercial broadcasting of black and white television which has been carried on for nearly ten years.

17. The new color television standards * are intended to permit the commercial broadcasting of the color television system proposed by the Columbia Broadcasting System, Inc. in the proceedings leading to the adoption of color standards and to preclude the commercial broadcasting of any other color television system.

18. Since the beginning of radio the effort has been to permit the highest possible quality of service in the spectrum space available.

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* Standards are the engineering rules governing the characteristics of the radio signal transmitted by operation of radio apparatus.

19. The principles laid down by the Commission for television in 1940 were that:

a.) television transmission standards permit the highest quality of service known to the art;

[fol. 872] b.) such standards leave ample room for all foreseeable improvements in service;

c.) such transmission standards be adopted as will permit all receivers to obtain pictures from all transmissions;

d.) standards should not be adopted until the potentialities of basic research have been fairly explored;

e.) the continuity of service to the public should be assured; and

f.) the industry be in substantial agreement upon the standards to be adopted.

20. These principles were reaffirmed by the Commission in 1947 with respect to color television.

21. The Order departs from all the foregoing principles.

22. The Order adopts standards which will not permit all receivers to obtain pictures from all transmissions.

23. The Order adopts standards which permit of only a low-quantity service and which put a low ceiling on future developments.

24. The Order will disrupt the existing television service.

25. The Order will seriously retard research and development in the television industry.

26. The Commission has completely disregarded the interests and the rights of the more than 9,000,000 people who will own black and white television receivers at the time the Order becomes effective. These receivers serve [fol. 873] an audience of nearly 35,000,000 people and represent an investment of over two billion dollars. This investment has been made in a period of only about four years. Yet it approximates the investment of the public in all existing sound radio receivers, both AM and FM.

27. Nothing whatsoever can be received by any of these 9,000,000 black and white receivers from broadcasts of the CBS color system.

28. These 9,000,000 owners of black and white television receivers were disregarded by the Commission although in the past it has expressly recognized that the receivers

sold to the public for a specified service should remain capable of receiving all transmissions of that service and has insisted that this be so.

29. In adopting this Order the Commission for the first time has departed from its uniform practice of seeking the best possible service known to the television art. Instead of adopting standards which would permit the highest available quality of service, the Commission has adopted standards which provide for an inferior service and which put a low ceiling upon the quality of the service that can be developed within those standards.

30. For the first time in its history, the Commission has established standards over the protest of the scientists, engineers and technicians of almost the entire radio and television industry. The Commission completely disregarded the knowledge and experience of the scientists, engineers and technicians of this industry although they were fully available to the Commission. This in spite of the fact that it is the industry which must live and develop under the standards set by the Commission.

[fol. 874] 31. The problem of the regulation of the technical aspects of radio and television is and always has been the obtaining of as high quality a service as is feasible within the spectrum space which can be allocated to any particular service. As an illustration, the spectrum space occupied by an AM broadcasting station is 10,000 cycles (10 kilocycles); the spectrum space assigned to an FM broadcasting station is 200,000 cycles (200 kilocycles); while the spectrum space allocated to a television broadcasting station is 6,000,000 cycles (6 megacycles).

32. The large amount of spectrum space required by a television broadcast station as compared with a sound broadcast station, either AM or FM, is occasioned by the fact that a great deal more information must be sent out over the air in order to create sight and sound on a receiver than is necessary to create sound alone.

33. These three broadcast services, AM and FM sound broadcasting and television broadcasting, are only three of a great many more services which require the use of the radio spectrum. These services include the military, police, international communications, ship communications, aviation, and others, each of which requires varying amounts of the available frequencies.

34. The problems attendant upon the creation of a commercial television service were intensified not only by the amount of spectrum space required, but also by the technical problems that had to be met if all receivers were to receive all transmissions.

[fol. 875] From the beginning of the consideration of television as a broadcast service the chief problems have been how much usable spectrum space was available and what technical transmission characteristics were necessary to provide a high-quality public service.

The Development of Television

Black and White Television

36. Experiments with television began in the 1920's. The first devices were crude and involved the use of a spinning mechanical scanning disc. Motion was jerky and the quality of the picture extremely poor.

37. However, in the middle of the 1920's mechanical scanning showed greater promise for immediate commercial operation than electronic methods. The Bell Telephone Laboratories and General Electric Company were working with mechanical scanning methods.

38. In spite of the work of these companies the inadequacies of the mechanical system were not overcome and research work was directed toward development of all-electronic methods of television.

39. As early as 1936 the industry recommended to the Commission that the television broadcast service operate in channels of 6 megacycles each, and television was allocated 6-megacycle channels for experimental purposes.

40. In 1936 RCA commenced the full-scale field testing of black and white television in New York City, broadcast-[fol. 876] ing a picture consisting of 343 lines and 60 fields.* The purpose of these broadcasts was to test what

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* Broadcasting is express *not* a common carrier service. Communications Act of 1934, as amended, Sec. 153(h).

* A television picture is formed by tracing an electron beam across the face of a picture tube in a number of lines. The number of lines in the picture is one of the basic determinants of the quality of the picture. A television picture consists of two fields, each field being half of the total scanning lines.

technical characteristics were necessary in order to provide a high-quality service. The number of lines was very shortly raised to 441 with the field rate remaining the same. In addition, other members of the industry were also testing various combinations of lines and fields and other technical characteristics of a television broadcast service.

41. The Commission was kept informed of this testing and experimentation by the industry, and in 1939 part of the industry, including RCA, sought authorization for commercial black and white television.

42. The Commission refused to authorize commercial black and white television at that time, and, in its Report of May 28, 1940,** the Commission reviewed the principles which it regarded as basic to the regulation of television.

The Principles of Regulation

43. In its 1940 Report the Commission laid down the principles of television broadcast regulation from which it has not deviated until the promulgation of the Order:

> "The Commission in addition to being charged with the duty of licensing radio transmission stations, has the obligation to promote experimentation in radio, encourage its wider use and 'regulate the kind of ap-
>
> [fol. 877] paratus to be used' by sound and television stations. These powers are set forth in Section 303 of the Communications Act which provides:
>
> 'The Commission, from time to time as public interest requires, *shall*
>
> 'Study new uses for radio, *provide for experimental uses of frequencies,* and generally *encourage the larger and more effective use of radio* in the public interest; . . .
>
> '*Regulate the kind of apparatus* to be used with respect to its external effects and the purity and sharpness of the emissions from each station and from the apparatus therein; . . .

** In the Matter of Order No. 65 Setting Television Rules and Regulations for Further Hearing—FCC Docket No. 5806.

'Make such regulations not inconsistent with law as it may deem necessary to carry out the provisions of this Act.'*

* * *

Standards Must Assure Single Uniform System

"From the duty to regulate the kind of apparatus to be used by broadcasting stations stems the duty to fix the transmission standards of such stations. Transmission standards may be simply defined as engineering rules governing the characteristics of the radio signal transmitted by the operation of radio apparatus. Such standards as a practical matter must require a fair degree of efficiency and assure to the public in basic outline a single uniform system of broadcasting *which will enable every transmitting station to serve every receiver within its range.***

"In its regulation of television in the public interest, *the Commission,* in the light of the evidence be- [fol. 878] fore it, *has set as its goal unfettered technical development and engineering advance.* In dealing with the problem of setting television transmission standards the Commission has, therefore, sought to avoid action which would freeze the state of the art at an unsatisfactory level of performance.

* * *

"The art of television has been under development for more than a decade. During this time the Commission has issued a number of licenses for experimental purposes looking toward the development of the science to the point where the Commission could be reasonably assured of television's readiness for a competitive public service *upon a sound technical basis and upon a single uniform system.*

* * *

"On January 3, 1939, the Commission appointed a committee, consisting of Commissioners Craven, Brown and Case, known as the Television Committee,

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* Emphasis supplied by the Commission.

** These, and succeeding italics, are supplied.

which was charged with the duty of investigating and submitting recommendations with regard to the fixing of television broadcasting standards by the Commission and the disposition of a number of pending applications for television experimental licenses.

"* * * The results of the Committee's studies were embodied in a public report dated May 22, 1939, in which particular emphasis was laid upon the vital questions of public interest which were inherently connected with the Commission's duty to prescribe uniform transmission standards in the television broadcasting field. * * *

'However, a serious question of public interest would arise in the future if the Commission should [fol. 879] *specify external transmitter performance capabilities differing from the operating capabilities of receivers in the hands of the public. This is because of the resultant possibility that the public's receivers would be incapable of receiving programs emanating from transmitters licensed by the Commission.'*

Standards Must Be Based on High State of the Art

"The Committee's studies disclosed that technical advancement of the art had not progressed to the point where it would be in the public interest to adopt any transmission standards for television broadcasting. *In the light of the demonstrated fluidity of the art and its current movement toward a higher level of efficiency, it was recognized that the acceptance of any fixed set of standards would entail the undesirable consequences of checking or retarding meritorious research.* It was, therefore, the Committee's recommendation that pending further studies upon the progress of television experimentation and research, no standards be adopted by the Commission.

* * *

Basic Facts of Television

"In order to make clear the nature of the controversy within the industry a brief explanation of the basic television methods employed and of the terms used is necessary. A complete scene cannot be transmitted instantaneously by presently developed

television methods. Therefore, it is necessary to transmit the picture by small successive elements, in a manner comparable to the eye reading the printed page of a book. This procedure of breaking the scene down is begun at the television camera by a process known as scanning. The picture at the receiver is made up of a single dot, caused by a stream of elec- [fol. 880] trons, moving very quickly and continuously across the screen to form lines. The entire process is so rapid that the resultant mosaic is perceived as a complete picture because the eye retains or carries over the original impression caused by each position of the dot.

"Increasing the number of elements and scanning lines in the television picture increases the detail and distinctness. The detail capability of the television system is therefore in part dependent upon the number of lines transmitted.

"The 'memory' of the human eye is, however, limited and therefore it is necessary to scan each scene completely in a fractional part of a second and in rapid repetition in order that the eye may perceive the series of individual pictures as a single continuous flickerless picture with continuous motion. The rate at which the complete scanning of a scene is accomplished is called the 'frame frequency', and means merely the number of times the complete scene is scanned per second. If the frame frequency is too low, the reproduced picture will have flicker and the motion will be jerky; if the number of lines is too small, the picture lacks clarity and detail. In general, it may be said that an increase in the number of lines can be made within a given band width of frequencies only by reducing the frame frequency.

All Possibilities for High Quality Must Be Explored

"*Two of the important television problems outstanding are to develop (a) a better picture with more detail and greater clarity and (b) a larger picture.* If the screen is enlarged with a given frame and line frequency, the quality of detail and clarity diminishes. *An increase in the number of scanning lines is the* [fol. 881] *only known method of satisfactorily accom-*

lishing either of the desired ends. This could be most easily accomplished by increasing the band width of frequencies employed by each station. Each of such stations, however, already requires a large segment of the radio spectrum, a band of 6000 kilocycles which is 600 times the width of that necessary for a standard broadcast station. *The number of radio frequencies being severely limited, it is regarded as essential to explore all possibilities of improving performance within the present 6000 kilocycle band assigned.* Since within any given channel an increase in the number of lines entails a lower frame frequency—fewer pictures per second—the problem of flicker and jerky motion is raised.

* * *

Standards Must Not Be Prematurely Frozen

"The keynote of the Commission's report and the policy underlying the Commission's rules was that television broadcasting was still in an experimental stage and that in view of evidence revealing a substantial possibility of significant improvements in the art, 'research should not halt' and 'scientific methods should not be frozen in the present state of the art.' *The Commission expressed the belief that the crystallization of standards at the current level of the art, by whatever means accomplished, would inevitably stifle research in basic phases of the art in which improvement appeared promising.*

* * *

Statute requires "Larger and More Effective Use" of Frequencies

"Indeed, action in the light of these facts was compelled by the Congressional mandate under which the Commission serves. *It would be a violation of its statutory obligations for the Commission to dis-*
[fol. 882] *regard any facts which might foreclose a proper exercise of its duty to fix transmission standards for a single uniform system of television broadcasting. Moreover, the Commission cannot ignore its duty to 'encourage the larger and more effective use*

of radio' and close its eyes to activities impending technical progress in the television art.

* * *

Public Interest in Continuous Service Must Be Protected

"* * * In general, it may be said that television transmission will reach satisfactorily only sets designed to receive the number of lines and frames and the type of synchronizing pulse transmitted. * * * Thus widespread public distribution of sets of a system operating on present levels will undermine incentive for further advance in television broadcasting and the Commission will be confronted with the accomplished fact of frozen transmission standards.

"It is this consideration that distinguishes the development of television from that of sound radio. At the time of the initial widespread distribution of sound radio receiving sets to the public, these sets were capable of receiving all types of radio transmission then being considered. General public use and improvement in radio transmission and reception could, therefore, go forward together without any substantial risk that the distribution of receiving sets would result in freezing transmission standards to the then levels. However, since television receiving equipment adequate to receive transmission on one system would often be incapable or inadequate to receive transmission by another system, the widespread distribution of such receiving equipment would tend to cause the particular system of transmission to which it is geared [fol. 883] *to become a firmly rooted and immobile standard.*

* * *

Technical Research Will Be Discouraged by Low Standards

"Contrary to the experience of other industries which have found that technical improvements were stimulated by large public use, in the television field a major portion of the industry takes the view that

successful promotional activities at this time can act only as an anchor on experimental efforts to go forward. *Premature crystallization of standards will, as has thus been pointedly illustrated to the Commission, remove the incentive for technical research toward higher levels of efficiency.* If technical research having this goal is retarded or halted, the Commission's duty to fix transmission standards with due regard for considerations of public interest will have been, for all practical purposes, nullified.

Industry Must Be Satisfied State of Art Permits Single High-Quality System

"It is, therefore, the conclusion of the Commission that in order to assure to the public a television system which is the product of comparative research on known possibilities, standards of transmission should not now be set. *It has further been decided that there should be no commercial broadcasting with its deterring effects upon experimentation until such time as the probabilities of basic research have been fairly explored.* * * * *As soon as the engineering opinion of the industry is prepared to approve any one of the competing systems of broadcasting as the standard system the Commission will consider the authorization of full commercialization.* * *

"*It may be expected that industry opinion will insist upon such standards as will give definite assurrance of satisfactory performance and of continu-*[fol. 884] *ity of service for the public comparable to the continuity of service displayed in the past history of the radio industry. At the same time these basic standards—the standard gauge they may be termed—should afford within their limits reasonable flexibility for future advances in the science of television broadcasting.* With the view to encouraging research and experimentation on a wholly flexible basis, the Commission is prepared to authorize broader, experimental operations by existing stations and by a number of additional stations."

While this review was occasioned in part by RCA's efforts to develop a television service with 441 lines, 60 fields, the principles enunciated in this Report have formed the basis of the regulation of television.

Adoption of Black and White Standards

44. On May 3, 1941, the Commission finally adopted commercial black and white television standards having 525 lines instead of 441, stating that 525 lines and 60 fields "giving substantially equal resolution and *more fully exploit the possibilities of the frequency bands allocated for television,*" and noted that these standards "represent, with but few exceptions, the undivided engineering opinion of the industry."

45. It is also important to note that at the time these standards were recommended and adopted existing television transmitting and receiving apparatus had not yet been developed to the point where the performance capabilities of these standards could be fully utilized. In fact these standards leave room today for further improve- [fol. 885] ment in black and white television. The significance of these standards is that they were set in order to provide the highest possible ultimate performance within a 6-megacycle channel.

Early Color Television

46. During 1940 and 1941 RCA, CBS and others were also working on color television. At that time the conception was that to obtain a color picture of equal quality with a black and white picture, approximately three times the bandwidth required by the picture, or video, part of the black and white service would be needed.

47. When the Commission instituted extensive hearings in 1944 to review the allocation of frequencies to the various services in the light of new technical developments, including those made in military researches, the question of color television was again brought forth. At this time the industry, including CBS, was agreed that color television should have at least the same picture quality as the black and white service. In the then state of the art, this meant that color television would require anywhere from 12 to 20 megacycles.

48. As a result of these hearings, the Commission reaffirmed the black and white standards which it had adopted in 1941.

49. On the basis of these standards which had twice been affirmed by the Commission, the commercial television broadcasting and manufacturing industry got its real start in 1946.

[fol. 886] *The Rejection of the Field Sequential Color System*

50. In the fall of 1946 the Commission instituted hearings on a CBS petition for the adoption of a wideband, high-definition, field sequential color television system.

51. During the course of the 1946-47 color hearings RCA introduced evidence with respect to the then state of development of its simultaneous color television system which utilized a 14-megacycle channel and which gave the same picture quality as existing black and white service.

The 1947 Reaffirmation of 1940 Principles of Regulation

52. In rejecting the CBS system, the Commission stated in its Report of March 18, 1947,* as follows:

> "In brief, the color television system proposed by Columbia provides for channels 16 megacycles wide, with color being transmitted sequentially. Under the proposed sequential system each picture is scanned through separate color filters—red, green and blue, in turn. These transmissions in the separate colors follow each other at the rate of 48 times per second. These three color transmissions are accepted by the receiver by means of a color wheel containing filters of red, green and blue, which rotates in front of the television screen in synchronism with a similar color wheel at the transmitter. When the images of the three [fol. 887] colors are so received, the eye, is enabled to see the picture in full color.
>
> "It should be pointed out that the only color television system as to which Commission approval is

* In the matter of Petition of Columbia Broadcasting System, Inc. for Changes in Rules and Standards of Good Engineering Practice Concerning Television Broadcast Stations—FCC Docket No. 7896.

requested in this proceeding is that proposed by Columbia. During the hearing Radio Corporation of America demonstrated another color television system. This is the so-called simultaneous system where each picture is scanned simultaneously in three colors—red, green and blue—and these transmissions are sent simultaneously on three different channels and are combined at the receiver to produce a color image. *Radio Corporation of America did not advance this system as one which should be approved at this time. R. C. A. stated that its system was still in the laboratory stage but presented it to the Commission as representing a system which could be developed for commercial use in four or five years and which, according to R.C.A., has many advantages over the sequential system.*

* * *

"It is obvious that before permitting a new television service to become established on a regular basis, a decision must first be made on fundamental standards. Otherwise, manufacturers of receivers could not start to build receivers, and the public could not purchase receivers with any confidence that they would be able to receive programs from all television stations, or that their receivers would not become useless immediately after they were purchased if the existting stations should change any of the fundamental [fol. 888] standards. Under these conditions, it is entirely unlikely that television receivers would be bought on any mass basis. The justification for allocating so much of the radio spectrum to television broadcasting—78 megacycles for Channels 1-13 and 440 megacycles for experimental television—is that television is an important medium for bringing news, education, culture and entertainment to large segments of the population. With the great demand for frequencies on the part of the other radio services which cannot be met in full, the Commission would not feel justified in allocating so many frequencies to television at the expense of the other radio services, if it were inevitably destined to be limited to small audiences.

Necessity for a High Set of Standards

"Before approving proposed standards, the Commission must be satisfied not only that the system proposed will work, but also that the system is as good as can be expected within any reasonable time in the foreseeable future. In addition, the system should be capable of permitting incorporation of better performance characteristics without requiring a change in fundamental standards. Otherwise, the danger exists that the standards will be set before fundamental developments have been made, with the result that the public would be saddled with an inferior service, if the new changes were not adopted, or if they were adopted, receivers already in the hands of the public would be rendered useless.

"Judged by the foregoing test, the Commission is of the view that the standards for color television proposed by Columbia Broadcasting System should not be adopted. In the Commission's opinion the evidence [fol. 889] *does not show that they represent the optimum performance which may be expected of a color television system within a reasonable time."*

53. Thus the Commission reaffirmed the basic principles of television broadcast regulation as set forth in its Report of May 28, 1940. It is these basic principles which have now been repudiated by the Commission's Order adopting commercial standards for color television.

The Development of the RCA Color Television System

54. Among the reasons for the development of the wide channel color television systems referred to in the Commission's Report of March 18, 1947 were

a) the fact that the then state of the art meant that a color picture comparable in quality with the black and white picture required more bandwidth, and

b) the expectation that the additional bandwith could be found and used.

In addition, no television service was as yet a true commercial reality.

55. By the fall of 1948 the belief that color television should find its place in wider channels had to be modified. This was true primarily because of the tremendous public acceptance of the new black and white service and the eventual desirability of more television stations and television channels than could be afforded if the channel width were to be two to three times as wide as 6 megacycles.

[fol. 890] 56. Consequently RCA devoted its attention to enabling its simultaneous color television system to operate in the 6-megacycle, rather than a 14-megacycle channel. The 14-megacycle simultaneous system, unlike the field sequential system, had already been so designed that one of the three color pictures could be received on a black and white set as a black and white picture. The problem was to find a way to transmit the full 14-megacycle picture in a 6-megacycle channel, and to do so without loss of picture quality.

57. This problem was solved by RCA in a dramatic way by the new and unique combination of the principles of the simultaneous system with other electronic techniques. *For the first time it was possible to transmit and receive a picture having 525 lines, 60 fields with picture quality equivalent to that of the black and white service, and with color too, in a 6-megacycle channel.*

58. Furthermore, the color picture could be received on a black and white receiver as a full-quality, high-definition picture without so much as touching the receiver.

59. The development of a color service to run on the same standard gauge track as black and white, with no sacrifice in picture quality, had at last become a reality.

60. This meant that all television receivers, past, present, or future, could receive all television transmissions whether broadcast in black and white or color. The broadcaster need lose not one of his carefully built-up audience. The set owner need lose none of the service for which he bought his set. The RCA color system is thus completely compatible with the present black and white system.

[fol. 891] 61. This system was not built in a day. Nor is its apparatus completely perfected. But neither was the apparatus for the black and white system perfected at the time of its adoption in 1941. To take an example, the image orthicon camera tube developed by RCA and upon

which all modern television now depends had not even been developed in 1941 and was not introduced commercially until late in 1946.

The Recent Color Hearings

62. The Commission's Report of March 18, 1947 contemplated that four or five years were needed for the commercial development of the RCA color system.

63. The Commission still regarded the period for development as requiring four or five years in January 1948. Commissioner Hyde, speaking for the Commission before the House Committee on Appropriations, stated with respect to standardization on a color system:

> "But the Commission felt, after hearing all of the evidence, that there was room for a good deal more improvement, and that if we crystallized the thing now by establishing standards which would control, that the public would not have as good service as will be possible in the reasonably early—near future. It was indicated it would be 4 or 5 years before it would be possible to do much about it."

64. Present at the hearing when Commissioner Hyde made his statement were a majority of the then Commission, including Chairman Coy, Commissioners Durr, Sterling and, of course, Hyde.

[fol. 892] 65. Of these four or five years referred to in January 1948 little more than two had passed when the Commission, on July 11, 1949, issued its "Notice of Further Proposed Rule Making (FCC 49-948)" (Exhibit A to the verified Complaint herein). In this Notice the Commission proposed, among other things, to consider color television systems again, provided that such color systems met two criteria:

a) that they operate in a 6-megacycle channel, and
b) that the pictures could be received on existing television receivers "simply by making relatively minor modifications in such existing receivers."

66. Pursuant to this Notice and the various amendments thereto, a hearing was held before the Commission *en banc*.

During the course of this hearing evidence was presented to the Commission with respect to three proposed color television systems all of which can operate in a 6-megacycle channel. One of these three systems was the all-electronic, high-definition, compatible color television system developed by RCA from its simultaneous system.

67. CBS presented evidence with respect to its field sequential color television system which had been squeezed into 6 megacycles only at severe sacrifice of quality. Not only did this 6-megacycle system recede from the quality of the 16-megacycle system rejected by the Commission in 1947, but the amount of picture detail was even smaller than the 6-megacycle system advocated by CBS in 1940. Apart from this, the 1950 CBS system was conceded by its sponsor to be fundamentally the same as the CBS 1940 system.

[fol. 893] 68. In addition, the uncontradicted evidence showed that not one of the 9,000,000 black and white receivers can receive a television picture from broadcasts on the CBS color system. Not until important and expensive changes have been made in the electronic scanning components of present black and white receivers can these receivers reproduce even a black and white picture from the CBS color transmissions. Thus the CBS system is not compatible with the black and white system.

69. The evidence further showed that to adapt existing receivers by making the necessary changes in the electronic scanning components of these 9,000,000 receivers in the hands of the public would involve a total cost to these receiver owners of hundreds of millions of dollars. The expenditure of this sum in thus adapting present receivers would not result in a color picture but only in a black and white picture and *this picture has considerably less than half the detail of a present black and white picture.*

70. The black and white television standards are such that the picture which appears on the face of the television receiver is comprised of approximately 200,000 picture elements. On the other hand, the uncontradicted fact is that the CBS color standards adopted by the Commission are such that the picture which appears on the face of the television receiver is comprised of only about 80,000 picture

elements. This is a serious decrease in picture detail and picture quality.

71. Color Television Incorporated also presented evidence with respect to an all-electronic and theoretically compatible (i.e., receivable by existing sets as is the RCA system) color television system.

[fol. 894] The Commission's First Report

72. On September 1, 1950, the Commission issued its First Report (Exhibit B to the verified Complaint herein) pursuant to which it did not adopt any color television system proposed at the hearings. Recognizing many of the CBS system defects, the Commission proposed that further time be allowed for the development of all color systems.

73. The time for further development was, however dispensed only for three months and only upon conditions. Only if black and white receivers manufactured from and after early November 1950, were redesigned in order, among other things, to receive CBS color transmissions as a degraded black and white picture, would the Commission refrain from adopting the CBS system.

74. Nor was this the only condition. In addition, the Commission issued its Second Notice of Proposed Rule Making (Exhibit C to the Complaint), proposing a drastic change in existing black and white television standards.

75. Not one word appeared in the record of the Commission proceedings as to any change in the existing black and white television standards. Nor was there any mention of such a change in the Commission's notice instituting those proceedings. Nevertheless, the Commission's Report made it clear that unless the industry would consent to this change in the black and white standards *without a hearing* the CBS color system would be adopted forthwith.

76. The complete impracticality of the proposed change in the black and white standards, as well as the fallacy of seeking to adopt the CBS system on any conditions, is [fol. 895] set forth in the RCA Comments with respect to the First Report (Exhibit D to the Complaint) which I signed.

77. The industry pointed out

a) the impracticality of redesigning their production of receivers to meet the manufacturing specifica-

tions on the time schedule proposed by the Commission, and

b) the fact that the Commission had no jurisdiction over set manufacture, direct or indirect, by threat or otherwise.

The Commission's Second Report and Order

78. On October 10, 1950, the Commission adopted its Second Report (Exhibit G to the Complaint,) reaffirming its First Report, and carrying out its threat to adopt the CBS system without waiting for the color developments referred to in the First Report. The Order adopting the CBS system is annexed to the Complaint as Exhibit H.

79. The Order set standards for color television which were contrary to the practically unanimous views of the television industry and its scientists and engineers, as well as those of independent experts.

80. The Commission gave as its justification for departing from the principle that all receivers should be able to get pictures from all transmissions—a principle first enunciated by the Commission in 1940 and thereafter reaffirmed by it—that it was "of the opinion based upon a study of the history of color development over the past ten years [fol. 896] that from a technical point of view compatibility" was too high a price to put on color.

81. The excuse for the adoption of the scientifically inferior and incompatible CBS color system at this time was the Commission's expressed fear that if more than the nine million receivers outstanding as of the effective date of the Order were manufactured, the Commission would not be able to adopt a color system which could not be received by such receivers.

82. It was this fear which led the Commission to freeze color standards at the low level of the CBS system in spite of its recognition that the fruits of fundamental research in color stimulated by the hearings might only now be emerging from the laboratory.

83. Any "study" of the "history of color development over the past ten years" from a "technical point of view", or any other point of view would establish that

a) many of the past ten years were war years,

b) even black and white television did not really start until four years ago, and

c) the present recognition that color television should occupy only 6 megacycles did not come until 1948.

84. The Commission expressly stated that it was disregarding the views of industry experts, and the whole profession of radio engineering is indicted in the concurring opinion of Commissioner Jones. This in a castigation so stinging as to include the implication that these [fol. 897] engineers have prostituted their professional opinions to the economic desires of their respective companies.

85. This again from a man with no engineering training himself and of an industry which has a record in its very short life of more dynamic and rapid advance than of any ever known, and of an engineering group which has accomplished literally miracles.

86. As Donald G. Fink, a distinguished independent electronics engineer and an outstanding editor in that field, wrote of Commissioner Jones' opinion:

> "The burden of this opus is that the industry committees, which have testified before the FCC on television matters, have systematically obstructed the introduction of color television by 'sham engineering testimony.'
>
> "According to Jones, none of the members of these [engineering] groups, excepting the two CBS members, have presented consistent, reliable and trustworthy testimony during the past ten years.
>
> "We wonder whether the worthy Commissioner knows the men he so recklessly and immoderately attacks. The combined membership of these committees comprises 121 men, 45 of whom are fellows of the IRE, 25 directors, past and present, of the IRE, the present president of the IRE and eight past presidents, six men who hold the IRE Medal of Honor and four others who have won the IRE Morris Liebmann Memorial Prize.
>
> "An indictment of these men is an indictment of the whole profession of radio engineering. They have [fol. 898] built the radio service of the United States

from its earliest days, they have managed the technical effort in electronics during two wars. Without their cooperation, the FCC simply cannot function in regulating its highly technical domain.

"When one man aligns himself against a whole profession, fair-minded men will conclude that the man is wrong. The only 'systematic' aspect of the record presented by Jones is his own systematic rejection of any testimony that disagrees with his own notions. Moreover, the testimony is rejected not merely as wrong, but as intentionally dishonest. This is demagoguery. Any claim that *all* contrary testimony on a given subject has as its object the exploitation of the public is rubbish. While Jones' views stand, he disqualifies himself as a judicial servant of the people."

87. The action of the Commission in precipitately adopting standards for the inferior CBS system departs from previous regulatory principles for the following reasons, among others:

a) The Commission has for the first time put to one side the all-important question of the ability of all television receivers to receive all transmissions, namely, compatibility. This the Commission has done although the progress of research and development had at last made a truly compatible color system a reality.

b) The Commission has for the first time departed from its previous insistence that standards be based upon the highest known state of the art and permit the fullest utilization of foreseeable developments in order that the fullest [fol. 899] utilization of the radio frequency spectrum might be assured.

c) The Commission has for the first time disregarded the recommendations of the scientists, engineers and technicians of the radio and television industry.

d) The Commission has for the first time disregarded the basic tenet that only a sound decision and not a hasty one can be in the public interest. Contrary to the requirement laid down in its 1940 Report and reaffirmed in its 1947 Report that the Commission must take account of any facts which might bear upon the attainment of high-quality

standards, the Commission has prematurely set inferior standards, thus frustrating the course of research and development in the television industry.

88. The Commission has also failed to take account not only of the facts before it but also of other facts (hereinafter mentioned) which it had a positive duty to take into account before formulating standards.

Compatibility Has Been Rejected

89. Compatibility makes it possible to add color broadcasting to the present black and white service without disrupting the entire structure of the present television service. Thus, with a compatible system the television service now enjoyed by approximately 35,000,000 viewers would neither be interrupted nor curtailed by the advent of color.

Adoption of a compatible system would mean that the more than 9,000,000 owners of black and white receivers, with an investment of over two billion dollars, would not be confronted with a loss of usefulness of their receivers. [fol. 900] Nor would they be confronted with the necessity of spending hundreds of millions of dollars merely to get degraded black and white pictures and to avoid loss of the service which they now have.

Adoption of a compatible system would mean that television broadcasters would not, in switching to color broadcasts, lose their entire audience.

Adoption of a compatible system would mean that the advent of color would not disrupt the business of thousands of television dealers, distributors, service organizations, manufacturers and broadcasters.

Compatibility is of the first importance to color television itself. Only with a compatible system is it economically practical for the broadcaster to broadcast color programs at all, for the reason that only with a compatible system does the broadcaster retain his audience.

From the standpoint of the public interest, compatibility is of first importance in obtaining color service.

90. It is not possible under the Commission's Order for any television station owner to broadcast programs on black and white standards and color standards at the same

time. Under the Commission's Order this would require each broadcaster to have two television cha els, which is impossible in view of the shortage of available frequencies. On the other hand, with a compatible color television system, a broadcaster transmitting a program on color standards is automatically broadcasting a signal which can be received at the same time on an existing black and white set, without any change in that set whatever.

[fol. 901] 91. By failing to insist upon compatibility, the Commission has abandoned the salient regulatory principle which it laid down in 1940. This principle is that the television transmission standards must assure to the public a "... system of broadcasting which will enable every transmitter to serve every receiver within its range."

The Commission Did Not Have Unbiased Technical Staff Advice

92. Only two of the seven members of the Commission have had technical training, and one of the two dissented from the adoption of the Order. The rest are laymen. Yet the First and Second Reports, upon which the Order is based, purport to contain highly technical judgments of the electronic art.

93. Paragraphs 70 through 74 and paragraph 75(g) of the Complaint relate to the professional, though not financial, interest of a Commission staff engineer in the CBS system. Those allegations have been incorporated in this affidavit.

94. From experience with the Commission, and with its predecessor, the Federal Radio Commission, I know that the Commission, composed primarily of laymen, is dependent for technical advice, which in turn is determinative of technical findings, upon industry engineers and its staff engineers.

95. In these proceedings only CBS engineers and the Commission staff engineer referred to in the Complaint, Edward C. Chapin, the co-inventor of an automatic adapter [fol. 902] switch usable only with the CBS system, testified in favor of the CBS system on technical grounds. The industry scientists and engineers, and independent experts, favored a higher quality and compatible system.

96. That Chapin was predisposed to favor the CBS system was apparent from the testimony which he gave. To illustrate, part of Chapin's testimony consisted of a comparison of the RCA color receivers with the CBS color receivers. Chapin stated that the CBS receivers were superior to the RCA receivers because the RCA receivers were too big and too complex. This testimony related to certain receivers having over 100 tubes used by RCA in the early part of the color hearings.

97. Chapin made no reference to the RCA tri-color tube receivers demonstrated by RCA. These receivers are substantially of the same physical size as present commercial model black and white receivers. One type of the RCA tri-color tube receiver used only 46 tubes, another used only 37 tubes—only 10 more than the commercial model black and white receiver of comparable type.

98. These receivers were demonstrated informally to members of the Commission's staff on March 23, 1950. It was on the very day that Chapin saw that demonstration that he prepared the exhibit on which he based his testimony comparing the CBS color receivers with the RCA color receivers. His testimony was given on April 11, after the informal demonstration of the simplified and compact receivers and after the formal demonstrations on the record on April 6, 1950. But Chapin took no account of these simplified receivers in his direct testimony.

[fol. 903] *The Condon Committee*

99. The Commission's technical judgments are wholly at variance with the judgments of a highly expert and competent committee of independent scientsts, who were commissioned to study available color television systems nearly two months before the Notice instituting these proceedings before the Commission (Annex C to Exhibit D to the Complaint).

100. This committee was organized at the request of the Chairman of the Senate Committee on Interstate and Foreign Commerce to give "sound, impartial, scientific advice" on color television. The Committee was headed by Dr. Edward U. Condon, Director of the National Bureau of Standards of the United States Department of Commerce and "was a small group of scientific persons

of repute, none of whom are employed by or have any connection directly or indirectly with any radio licensee or radio-equipment manufacturer." (ibid, p. iv)

101. In its Report, which was printed by the Government as Senate Document No. 197 of the 81st Congress, 2d Session, and widely distributed among members of Congress and the public weeks before the Commission's First Report the Condon Committee considered at length the color systems proposed, and analyzed the present and potential performance of those systems. This analysis was based on the testimony given before the Commission during the hearing, the demonstrations before the Commission and certain other demonstrations and tests. Although the Condon Committee did not recommend the adoption of any specific system, this distinguished group of scientists did determine which of the systems was superior in respect [fol. 904] of the technical performance characteristics upon which the choice of a color system depends. The introduction to the Report concludes:

> "It is hoped that the report will provide a comprehensive and understandable basis on which the technical factors may be considered *in arriving at a decision.*"

102. The first four of the performance characteristics which the Condon Committee stated were "of paramount importance in comparing color television systems" were Resolution, the Flicker-Brightness Relationship, Continuity of Motion, and Effectiveness of Channel Utilization. As will be shown, the Commission's Reports either ignore or seek to minimize the advantages of the RCA system over the CBS system in respect of three of these four essential performance characteristics.*

Resolution

103. Resolution means the number of picture elements within the television picture area. The greater the number of picture elements, the greater the amount of detail or resolution in the picture.

104. In discussing resolution, the Commission's First Report compares the CBS color system with the black and white system and also compares the RCA system with the

present black and white system. The vital and determinative comparison of the RCA color system with the CBS color system is never made, and the discussion is carefully [fol. 905] worded so that the significance of the difference between the two color systems is wholly obscured.

105. Even using the Commission's own figures as to the resolution afforded by the RCA color system, however, the fact is that the RCA color system has 134,000-200,000 picture elements per picture as against the 80,000 picture elements of the CBS system. The poor resolution provided by the CBS 1940 6-megacycle field sequential color system was a principal reason why CBS went in 1946 to a 16-megacycle field sequential color system. The resolution of the 1940 system was simply not good enough. But the resolution of the 1950 6-megacycle field sequential system adopted by the Commission is even poorer than the resolution of the 1940 system which had about 100,000 picture elements.

106. The difference in the resolution of the RCA system and the resolution of the CBS color system is an important and fundamental system difference. The superior resolution of the RCA system is a fundamental long-range advantage of the RCA system over the CBS system which has been fully recognized by the Condon Committee.

107. The Commission in 1940-1941 recognized the importance of a television system providing more detail and greater clarity. But in the Commission's present action actual picture detail and clarity are not given weight.

108. The Commission in 1947, in rejecting the CBS 16-megacycle system and referring to the desirability of narrow band color systems, stated that "It should be emphasized that narrowing the bandwidth should not be at the expense of * * * picture detail". But in the Commission's present action this principle is repudiated.

[fol. 906] *Flicker-Brightness Relationship*

109. The flicker-brightness relationship refers to the fact that television, like motion pictures, provides the illusion

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* The difference between the RCA and CBS systems with respect to Continuity of Motion, the third performance characteristic considered by the Condon Committee, is relatively slight.

of continuity and motion through a series of pictures. As in motion pictures, the light on the television screen is cut off between successive pictures. If the rate of repetition of the picture is too low, the light on the screen will appear to blink on and off and the picture will flicker. The higher the rate of picture repetition, the greater is the illusion of continuous illumination. This permits the use of higher picture brightness without the effect of flicker.

110. The controlling aspect of a television system with respect to flicker is the field repetition rate. If the field rate is too low, flicker is annoying and induces severe visual fatigue.

111. The field rate of the RCA color system is 60 per second; the comparable figure for the CBS system is 48 per second. Although the CBS system has a color field rate of 144 per second, the effective field rate of that system is 144 divided by 3 (colors) or 48 fields per second.

112. In the Commission's First Report, the discussion of the flicker-brightness relationship is concentrated upon the possibility of improving the flicker-brightness performance of the CBS system through the use of long-persistence phosphors, *an apparatus development* which will be equally available to all systems but cannot be used in CBS disc-type apparatus.

113. The difference in the field repetition rate of the RCA and the CBS color systems makes it possible for the [fol. 907] RCA system to have, without objectionable flicker, nine times the brightness of the CBS system. This fact is wholly ignored in the Commission's Reports, although RCA's advantage exists no matter what the apparatus considerations may be.

114. The advantage of the RCA system in making possible pictures which are nine times brighter, without objectionable flicker, than the pictures obtainable with the CBS system is an important and fundamental system difference. It is a fundamental long-range advantage of the RCA system over the CBS system which has been fully recognized by the Condon Committee. Yet this difference is not even mentioned in the Commission's Reports.

115. The fundamental facts with respect to flicker and brightness in the CBS system have not changed since the Commission's decision in 1947. But in 1947 the Commis-

sion said with respect to flicker and brightness in the CBS system:

> "Another possible solution was suggested by Dr. Goldmark [of CBS]. He testified that it was possible to increase brightness without changing the frame [or field] rate and still avoid flicker. This could be done, he stated by employing tubes with a slow decay [ie. long persistence] phosphor. Dr. Goldmark admitted that such tubes have not yet been developed. Moreover, R.C.A. testified that it had experimented with such tubes and had found them to be very complicated. Witnesses for DuMont testified that that company had also conducted experiments with tubes having slow decay phosphor but found them objectionable. Apparently such tubes resulted in objectionable [fol. 908] trails being left on the face of the tube. It is not possible to resolve this dispute until tubes of the type described by Dr. Goldmark are in fact developed and are sufficiently field tested so that it can be stated with assurance that they will work satisfactorily.
>
> "In summary, the Commission is unable to conclude from the evidence that the brightness of Columbia picture is adequate for home use under normal circumstances or that it can achieve such brightness without encountering objectionable flicker. In the absence of more convincing evidence on the points, the Commission is of the opinion that on the point of brightness and flicker alone, the risk of approving the Columbia standards at this time is that color television might be forced to limp along with a picture that is not sufficiently bright for general home use or is subject to objectionable flicker."

Effectiveness of Channel Utilization

116. Color television, like the present black and white television system, will be broadcast in a 6-megacycle channel. The available channel width is used by a television system to obtain picture detail, brightness without flicker and continuity of motion. As the Condon Committee has noted, a system whose performance is inadequate in any of these respects makes relatively ineffective use of the channel.

117. In the Commission's Reports, the relative effectiveness of channel utilization of the RCA and CBS systems . . . [fol. 909] not even mentioned. The Condon Committee, however, found,

> "The effectiveness of channel utilization of the RCA color system is the highest of all the systems"

proposed to the Commission during the color hearings. This omission is one of the most striking of all of the omissions in the Commission's First and Second Reports.

118. The radio spectrum is a priceless national asset. Its conservation has been entrusted to the Commission. Space in the spectrum is severely limited by the needs of other radio services. Yet the Commission has abdicated the responsibilities which have thus been entrusted to it by ignoring the relative effectiveness of the RCA and CBS color systems in using the 6-megacycle channel to provide high resolution and flicker-free brightness.

119. In doing so, the Commission has again departed from the basic regulatory principles which it has followed since 1940 and which are enjoined upon it by the statutory obligation to "encourage the larger and more effective use of radio in the public interest."

120. In adopting the present black and white system of 525 lines in 1941, and rejecting a 441 line system which was then discussed, the Commission said that its preference for the 525 line system over the 441 line system was based on the fact that the 525 line system ". . . more fully exploit[s] the possibilities of the frequency bands allocated for television."

121. The advantage of the RCA system over the CBS system in more fully utilizing the 6-megacycle channel is [fol. 910] a fundamental and long-range system advantage. As the Condon Committee found:

> "The techniques for improving channel utilization include line interlace, dot interlace, the mixed-highs method, and the use of long-persistence receiver screen materials to reduce flicker."

122. The RCA system makes full use of the techniques of line interlace,* dot interlace ** and the mixed-highs *** method. Because of the high field rate in the RCA system (60 fields per second), the use of long persistence phosphors to reduce flicker is unnecessary. In any event, use of long persistence receiver screen materials is an apparatus matter, and all the different types of receivers demonstrated by RCA can make use of such long persistence phosphors.

123. The CBS system, on the other hand, does not include the use of either dot interlace or the mixed-highs method. The technique of dot interlace cannot be incorporated in the CBS system without a change in the transmission standards for that system, and the technique of mixed-highs cannot be utilized by the CBS system even with such a change in standards. Furthermore, as the Commission's First Report recognizes, long-persistence screen materials cannot be used to improve the poor flicker-brightness performance of the CBS disc receivers upon [fol. 911] which so many of the advantages claimed by the Commission for the CBS system depend entirely.

124. Finally, the Report of the Condon Committee concludes "the real limit to future progress is that imposed by the nature of the scanning standards, not by present equipment limitations or present relative costs." The nature of the RCA scanning standards leaves the most room for future progress.

125. It should also be noted that the Condon Report is

** Dot interlace is a scanning method used to change the scanning order of the picture dots in successive fields so as to achieve greater definition in a given bandwidth.

*** Mixed-highs refers to the mixing of the high frequency components of a color television signal. This makes it possible to use shades of gray in a color television picture to add fine detail just as shades of gray are used in color printing to furnish the fine detail of the printed picture.

* Line interlace means scanning one set of lines for one field and scanning another intervening set of lines for another field. This is done to reduce the flicker by increasing the number of fields for a given number of complete pictures.

not based upon theory alone. The Report is also based upon actual observation of the performance of the three proposed systems—observation as extensive as that of the Commission and observation by those who were qualified to interpret what they saw.

The Leading Electronics Experts Have Been Repudiated

126. There appeared before the Commission responsible experts of many television industry committees and of many industry laboratories. Dr. Du Mont and Dr. Goldsmith of the Allen B. Du Mont Laboratories appeared. Dr. Baker of the General Electric Company, D. B. Smith of Philco, Dr. Lee De Forest, Dr. Engstrom and Dr. Brown of RCA appeared. Independent experts such as Donald Fink of the Joint Technical Advisory Committee appeared. All these people, and others, testified to the effect.

a) that a compatible system should be adopted,
b) that a high-quality system should be adopted, and
[fol. 912] c) that the Commission should not stultify research by accepting anything less.

127. All these people have high and honorable reputations in their professions. All these people have heretofore been respected and heeded by the Commission. None of these people advocated the adoption of the CBS system.

128. In addition, the Commission's Reports are in conflict with the Report of the Condon Committee in respect of technical matters of controlling importance. Although the Condon Report made available to the Commission significant scientific conclusions, neither Commission Report mentions the Condon Committee nor its Report. Moreover, I am advised that one of the members of the Commission has stated in a public address that the Commission did not even consider the Report of the Condon Committee in reaching its decision.

129. Never before in my experience has a supposedly technical expert tribunal acted contrary to the best technical advice that can be had.

The Results and Prospects of Research Have Been Ignored

130. The advantages of the RCA system over the CBS system, which were considered of primary significance by the experts of the Condon Committee and of the industry,

stem from differences in the fundamentals of the RCA and CBS color systems. These system fundamentals include the number of lines and fields and the method of scanning the image which is to be televised. The perform-
[fol. 913] ance advantages resulting from these fundamental system differences are disregarded by the Commission.

131. In contrast to the Condon Committee, the differences between the two systems which are emphasized in the Commission's Reports are differences relating to apparatus rather than inherent system differences.

132. For example, the Commission's Reports find fault with RCA's color fidelity, an observation obviously based upon early demonstrations of *principles*, not of apparatus perfection. Yet the fundamental fact regarding color fidelity is stated by the Condon Committee: "There is, as noted previously, no basic difference in the color fidelity of the three color systems".

133. The dynamic nature of research is such, however, that even though the laboratory apparatus first demonstrated by RCA (on October 10, 1949) was deficient in actual color rendition, the improvement by April, 1950 was such that it was the subject of unsolicited comment on the record by two members of the Commission. Dr. Goldmark (who is now Vice President and Chief Research Engineer of CBS) admitted on the record that RCA's color picture had "improved a thousand percent" between October, 1949 and April, 1950.

134. Furthermore, the all-electronic receivers used by RCA in connection with its system were greatly simplified during the course of the hearings. These simplified receivers used the RCA tri-color, direct-view picture tube which was demonstrated in April of 1950, and which is *a development which at least one leading television expert thought would be impossible.*

[fol. 914] 135. In spite of this there is no favorable reference in either Report of the Commission to the development of the tri-color tube by RCA and its demonstration on April 6, 1950. All the Commission has to say about this tri-color picture tube, which has been hailed as a major ac-

complishment by the scientific world, is that such a tube is not "an assured fact."*

136. The only basis given for this statement by the Commission is the fact that the tube was not demonstrated until "late in the proceedings." The disingenuousness of characterizing the tri-color tube, which was as concrete to those who saw it as anything could be, as not being "an assured fact" is shown by the Commission's statement that on the basis of the record long-persistence phosphors are practical and that they may overcome the flicker limitation of the CBS system.

137. This finding, favorable to CBS, is made although CBS did not "demonstrate" a long-persistence phosphor until April 26, 1950, twenty days after demonstration of the RCA tri-color tube. I am informed that only a green phosphor was "demonstrated" and that only a stationary slide was used in the "demonstration" of this long-persistence phosphor so that the tendency of such phosphors to cause "smearing" on the face of the picture tube could not be tested. For years "smearing" has been one of the principal difficulties in the use of long persistence phosphors.

138. Not only has the Commission refused to credit much of the evidence in the record with respect to the RCA [fol. 915] system, even as concrete evidence as the RCA tri-color tube, but the Commission has also refused to take into account additional information which has been fully available to it after the end of the hearings.

139. This is a sharp reversal of the Commission's previous principles, which fully recognized the obligation of a regulatory body in a highly dynamic electronic art to at least keep itself abreast of scientific research and development. As the Commission stated in 1940:

> "It would be a violation of its statutory obligations for the Commission to disregard any facts which might foreclose a proper exercise of its duty to fix transmission standards . . ."

* In contrast to the statement that the tri-color tube is not an assured fact, on October 31, 1950 the Commission requested that RCA turn over a tri-color tube to CBS.

140. The Commission has wholly disregarded the continuing results of RCA's research. On July 31, 1950, RCA filed with the Commission its Progress Report, the text of which is included as Annex D to the RCA Comments (Exhibit D to the Complaint). The RCA Progress Report was submitted to the Commission a month before the Commission's first Report, and over two months before the issuance by the Commission of its Order.

141. The achievements reported in the Progress Report confirmed the testimony of industry experts during the hearings as to improvements possible with the RCA system and associated apparatus. If the testimony had been accepted, there would, of course, have been no need to consider a report which said that improvements which had been promised during the hearings had actually been accomplished. But before a decision was adopted which rejected both the testimony and the RCA system on the basis [fol. 916] of defects which the Progress Report said had already been eliminated, it was the duty of the Commission to keep itself informed and to observe for itself the accomplishments stated in the Progress Report.

142. The accomplishments which RCA has made with respect to the apparatus used with its system are not matters which leave room for differences of opinion. They are concrete and indisputable. For example, the single direct-view tri-color tube demonstrated by RCA on April 6, 1950, was not a finished product in respect of the number of phosphor dots on the face of the tube. Consequently, this tri-color tube did not utilize all the picture detail made available by the RCA system. However, in subsequent developments (which were stated at the hearings to be in progress) the number of phosphor dots on the face of the RCA tri-color direct-view tube has been nearly doubled. Consequently, the tri-color tube now provides resolution capabilities comparable to the full picture detail afforded by the RCA color system.

143. The improvement in the brightness of the RCA tri-color tube is another concrete example of the significant apparatus developments which have taken place since the close of the hearings. In its then state of development, the tri-color tube demonstrated on April 6, 1950, had a maxi-

mum highlight brightness of 7 foot lamberts,* and much was made of this fact by the Commission. Development continued, however, and by July 31st the brightness of the tri-color tube had been increased to 20 foot lamberts. The tri-color tubes developed since July 31st by RCA have attained even greater highlight brightness. These bright- [fol. 917] nesses exceed the brightness of many present commercial models of black and white receivers.

144. The Commission's disregard of its obligation to take account of all the relevant facts, when necessary to reach a decision in rule-making proceedings which will be in the public interest, is shown by its failure to consider certain demonstrations made by Hazeltine Electronics Corporation. The Hazeltine demonstration, as stated by the Condon Committee, provided "conclusive proof" of the efficacy of the mixed-highs technique in providing a color image having substantially the same quality as an equivalent simultaneous color transmission in a channel three times as wide. The use of mixed-highs is an important advantage of the RCA system which cannot be achieved by the CBS system. The Commission ignored the informal Hazeltine demonstration and in its First and Second Reports treated the use of mixed-highs as a defect rather than an advantage of the RCA system.

145. The Commission's disregard of its obligations is also shown by its failure to consider the new all-electronic, compatible color system which was announced by the General Electric Company. The Commission similarly ignored the new incompatible system announced by Color Television Incorporated. The announcement of these two new compatible systems was made more than a month before the Order was issued adopting the incompatible CBS system. The Commission's refusal even to consider these new compatible systems is plain and unmistakable proof of the Commission's disregard of the public interest in a fully compatible color system.

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* A footlambert is the unit for measuring the brightness of light reflected from a surface.

[fol. 918] RCA Petition for Further Viewing by Commission

146. The Commission's First Report, upon which the Order adopting the CBS system is based, expressed doubts as to the RCA system—doubts with respect to its color fidelity, the brightness of its receivers and even its resolution. It was largely on the basis of such doubts that the RCA system has been put aside.

147. Prior to the issuance of the Commission's Order adopting the CBS system, RCA filed a Petition which would have enabled the Commission to resolve its "doubts" about the RCA system and correct its errors. This Petition asked the Commission:

> "(a) during the period December 5, 1950 to January 5, 1951, to review the improvements made in the performance of the RCA system; and
>
> "(b) during the period to June 30, 1951, to view experimental broadcasts of color signals under the RCA, CBS, CTI and other systems, before making a final determination in respect of color standards."

It was further stated in that Petition:

> "During the period December 5 to January 5 we will show the Commission the improvements made in the performance of the RCA system, with particular reference to those points about which the Commission expressed doubts. Some of those improvements are set forth in the RCA Progress Report of July 31, 1950. [fol. 919] "By June 30 we will show that the laboratory apparatus which RCA has heretofore demonstrated has been brought to fruition in a commercial, fully-compatible, all-electronic, high-definition system of color television available for immediate adoption of final standards."

148. The Petition was denied, and in its Second Report the Commission concluded that no improvements in existing systems warranted a reopening of the record. This conclusion was arrived at by the Commission without even

looking at the improvements referred to in the RCA Petition.

The Refusal to Let the Public Have a Compatible System

149. The effect of the Order is to limit commercial broadcasting of television in color to the CBS system. The order deprives the public of a compatible system.

150. No finding has been made by the Commission that commercial broadcasting of color on the RCA system or any other compatible color system would be contrary to the public interest. Nor would such a finding have any support in the record.

151. The commercial broadcasting of color on the RCA color system could not injure the public interest because the RCA color system is fully compatible. RCA color transmissions are reproduced on existing black and white [fol. 920] receivers as high-quality black and white pictures. In addition, if receivers capable of operating on the CBS color system should be manufactured and sold those receivers too would reproduce RCA color transmissions as black and white pictures, just as they reproduce in black and white standard black and white broadcasts.

152. If the RCA color system actually has the defects which the Commission thinks it perceives, color receivers for the RCA system will never be widely sold and the RCA color system will never be widely used by broadcasters.

153. But if an all-electronic, high-definition, compatible color system, such as the RCA color system does have the advantages claimed for it by impartial scientists and experts, the public will choose the RCA color system.

154. The Commission's action in denying the public commercial broadcasting in color on standards compatible with black and white standards—on a system receivable on every receiver now owned by the public and which will be owned by the public in the foreseeable future—is not an action in the public interest. It is arbitrary and capricious action which is contrary to the public interest.

The Injury Resulting From the Order

155. The irreparable injury resulting from the unjustifiable standardization upon the CBS system is plain. As the Commission stated in its May 28, 1940 Report:

> [fol. 921] "In the light of the demonstrated fluidity of the art and its current movement toward a higher level of efficiency, it was recognized that the acceptance of any fixed set of standards would entail the undesirable consequences of checking or retarding meritorious research."

In its First Report, the Commission has recognized that great developments in color television are being made. But the Commission, in violation of its duty, has chained those developments to a television system which the science of electronics has long since passed by.

156. All the research and development on the RCA all-electronic, high-definition, compatible color television system has, to a large extent, been jettisoned by the Order. There can be no incentive for reseaerch when its results are by administrative fiat unusable. Advances in technical research depend largely upon the incentive of the scientists and engineers who are engaged in research to succeed. Unless the Commission's decision in these proceedings is to last, it should never have been made. If it is to last, the development of a system permitting high-quality compatible color standards is fruitless.

157. The astounding progress of this newest addition to the list of American industrial accomplishments is due wholly to the unlimited incentive which has been the stimulus of its laboratories and research engineers. Never before has the opinion of the illustrious group of scientists upon which this industry has thus far depended been so abruptly rejected and so gratuitously insulted. The feeling of hostility toward their efforts, engendered by the condemnation of this Commission, is bound to result in a dimi-
[fols. 922-926] nution of the inventive flow from this group. The low ceiling of the system adopted is certain to discourage further improvement. The Commission has standardized on the hand-crank car when already the self-starting streamlined model is in being.

158. The effect of the Order upon RCA's effort and the millions of dollars invested in its system is apparent. The effect of the Order upon television research and development, and upon the public interest is equally apparent.

C. B. Jolliffe.

Sworn to before me this 8th day of November, 1950.

George J. Higney, Notary Public, State of New York, No. 24-6894500, Qualified in Kings County, Cert. Filed with Kings Co. Clk. and Reg., Cert. Filed with N. Y. Co. Clk. and Reg., Term Expires March 30, 1952 (Notarial Seal).

[fol. 927] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

AFFIDAVIT OF WALTER A. BUCK

COMMONWEALTH OF PENNSYLVANIA,
County of Montgomery, ss.:

WALTER A. BUCK, being duly sworn, deposes and says:

1. I am Vice President and General Manager of the RCA Victor Division of the Radio Corporation of America (hereinafter called "RCA"), one of the plaintiffs herein. I am familiar with the television manufacturing business [fol. 928] in general and RCA's television manufacturing business in particular. I have read the Complaint and the affidavit of C. B. Jolliffe.

2. This affidavit is made in support of plaintiff's motion for a temporary or interlocutory injunction and a temporary restraining order restraining, enjoining and suspending the promulgation, operation and execution of the Order of the Federal Communications Commission (hereinafter sometimes called the "Commission"), adopted October 10, 1950, effective November 20, 1950, fixing standards for the commercial broadcasting of color television. This affidavit is also submitted in opposition to defendants' and intervener's motions to dismiss the Complaint or for summary judgment.

3. I am the holder of a Bachelor of Science degree in

Electrical Engineering and a Master of Science degree in Mechanical Engineering from Kansas State Agricultural College (now Kansas State College of Agriculture and Applied Science). I also hold the degree of Master of Business Administration from the Graduate School of Business Administration of Harvard University. I am a member of the Board of Directors of RCA. I have been associated with RCA since 1948, having been President of Radiomarine Corporation of America in 1948 and, since January, 1949, a Vice President of RCA. Prior to associating myself with RCA, I was a member of the United States Navy, retiring in 1948 with the rank of Rear Admiral. From 1946 to 1948, I was Chief of the Bureau of Supplies and Accounts and Paymaster General of the United States Navy.

[fol. 929] Growth of the Television Industry Under Present Television Standards

4. RCA, through the RCA Victor Division, is now and for some time has been extensively engaged in the manufacture and sale of television transmitting and receiving equipment, including tubes.

5. Since RCA began the sale of television receivers in 1946, the number of such receivers which it has manufactured and sold has steadily increased. The public has already invested over a half billion dollars in RCA television receivers.

6. Upon an industry-wide basis an estimated 9,000,000 customers will have invested over two billion dollars in black and white television receivers on the effective date of the Order.

7. The television transmitting and receiving equipment manufactured and sold by RCA has been designed in accordance with the standards adopted in 1941 by the Federal Communications Commission for commercial black and white television service. This equipment has been scientifically designed in order to give to the public the best possible television service at the lowest possible cost.

8. The initiation, development and growth of the television broadcasting and receiving industry would not have been possible had not the standards set by the Commission been of high quality and had they not been adopted with the

express view to protecting the public against obsolescence. [fol. 930] 9. The public acceptance of black and white television based upon the existing black and white standards has been unequalled in the history of any industry or public service.

10. The incredibly large sale of television receivers would not have been possible without the concurrent initiation, development and growth of a black and white television broadcast service which, in turn, has also depended upon the sale of receivers described above.

11. It is on this foundation that the entire television industry rests. The quality of the present service, the improvements and reductions in price to the public that have been made and the incredible expansion of the industry as a whole, are all due to the fact that manufacturers could rely and build upon a single set of enduring, high-quality standards.

RCA's Investment in the Manufacture of Television Transmitting and Receiving Equipment

12. At the present time, the investment of RCA in the manufacture, sale and servicing of television transmitting and receiving equipment, including tubes, is $76,000,000, and approximately $55,000,000 of this investment is devoted to the manufacture, sale and servicing of television receiving equipment.

13. RCA employs at the present time approximately 28,000 persons in connection with the manufacture, service and sale of television equipment, and 21,000 of these persons are employed in connection with the manufacture, sale and servicing of television receiving equipment.

[fol. 931] Immediate and Irreparable Injury Resulting From the Commission's Order

14. The promulgation of the Commission's Order has irreparably injured RCA. If the Order is put into operation, it will continue to irreparably injure RCA.

Impairment of Market Acceptance of Present Television Receivers

15. The promulgation of the Commission's Order adopting an incompatible color service has resulted in a state of confusion in the television industry and in the minds of the purchasing public. The public does not know, and cannot determine, to what extent future television broadcast service will be in color and to what extent it will be in black and white. The public does not know, and cannot now determine, when, to what extent and at how great a cost the necessary adapters and converters will be available. All the public does know is that present television receivers will not be able to receive programs transmitted pursuant to the standards adopted by the Commission's Order without various modifications and then only by accepting a degraded picture.

16. Consequently, manufacturers of television receivers do not know, and cannot determine, at least for a considerable period of time, whether a public demand will exist for the present type of receiver, new color receivers or various combinations of the two, if and when color programs using the CBS system become commercially available.

[fol. 932] 17. Any continued unsettlement of the market must inevitably adversely affect all manufacturers, sooner or later. It has already been encouraged by the widely publicized statements of the Columbia Broadcasting System, Inc. (hereinafter called "CBS"). Frank Stanton, President of CBS on October 15, 1950 broadcast a statement over the CBS network advising prospective purchasers of television receivers that if they refrained from buying present receivers for six months, they might save some money. In still another statement, Arthur Godfrey, during his program "Arthur Godfrey's Talent Scouts" broadcast over the CBS television net work on October 23, 1950, is reported to have advised the public to "wait about six months" before buying a television receiver. This unsettled condition of the market for television receivers may be expected to increase as CBS continues and expands its campaign publicizing and promoting its incompatible color system.

18. This confused and unsettled condition has impaired the market acceptance of present television receivers and

it can be expected that such a condition will continue should the Commission's Order be put into operation.

19. Despite the existence and continuance of this condition, RCA, if it is to continue its television manufacturing operations and maintain its payroll of some 21,000 employees engaged in the manufacture and sale of television receivers, is obliged to make substantial commitments for future production.

20. RCA's production and sale of television receiving equipment is planned many months in advance. Commit- [fol. 933] ments are entered into, components are purchased or contracted for, and manufacturing facilities are expanded in order to meet a predicted demand. This is illustrated by the necessary forward planning and scheduling by RCA in order to place on the market a "line" of television receivers which are reflected in their major aspects in a chart annexed hereto Exhibit A. In order to place a "line" of RCA television receivers on the market, it is necessary for the first step to be taken some ten months previously and additional steps and commitments are required to be taken and made during the succeeding months well in advance of the commencement of production itself.

21. In addition to the time required by RCA itself for the development of styling and model shop samples, a period of three to six months prior to the commencement of production is required by outside suppliers to enable them to furnish cabinets and machine parts which will be used in production. Likewise, RCA must commit itself to other suppliers of production materials three to four months in advance of the dates on which such materials will be used in production.

22. On October 26, 1950, RCA had commitments to suppliers for various materials and components for the manufacture of the current television merchandise in the total amount of approximately $55,000,000 and its inventory of materials as of September 30, 1950 amounted to approximately $15,000,000. Such commitments and inventory are necessary to cover production requirements through February, 1951. Additional commitments will have to be made in the immediate future in order to secure sufficient materials for March production. The period in advance of production during which materials must be ordered is

[fol. 934] steadily increasing because of the increasing government requirements for defense mobilization.

23. The television receivers now being produced from materials and supplies on hand and committed for will have a total market value of approximately $100,000,000 when completed, on the assumption that a reduction in demand does not force a reduction in price.

Unacceptability of CBS Color Television Receiving Equipment

24. The experience of the radio industry shows that conversions which involve receiver modifications are not widely accepted and do not usually result in satisfactory performance.

25. The modification of existing receivers needed to receive programs in black and white might be accomplished by the installation of a special adapter. RCA has estimated that the cost to the public of such an adapter will be at least $50, plus installation charges. After this modification, by purchasing and installing an additional device advocated by CBS and called a disc type converter, consisting primarily of a spinning mechanical disc and its housing, it is possible for some receivers to obtain color transmissions pursuant to the proposed system. The cost of such a converter has been estimated at approximately $100.

26. However, even after incurring this expense for such an adapter and converter, present television set owners will sustain a loss of picture size if their picture tube is larger [fol. 935] than 12½ inches. This limitation is due to the fact that the disc must be more than twice as large as the face of the picture tube in the receiver. As a practical matter this fact limits the size of a direct-view receiver picture to 12½ inches, since a disc larger than 26″ in diameter whirling at a high speed is not considered practical. The seriousness of this limitation is shown by the fact that over 99% of the television receivers in the hands of the public are direct-view receivers and it is estimated that approximately 90% of all receivers sold today are receivers having picture tubes of 16 inches or larger.

The Impairment of Growth of Television

27. The Commission's adoption of the incompatible color system will further irreparably injure RCA and other manufacturers by lowering the present high-quality standards of black and white television and at the same time increasing the cost of television receivers designed to receive broadcasts using this system.

28. The public confronted with inferior black and white and color reception at a cost substantially above the present cost, can be expected to resist sales efforts in support of receivers designed to bring them such inferior service. Such a reaction will not only impair, but will seriously stifle, the growth of the television industry.

29. The promulgation of the Commission's Order has worked irreparable injury to RCA, the television industry [fol. 936] and the consumer. If the Order becomes effective it can only serve to increase this injury.

Walter A. Buck.

Sworn to before me this 8th day of November, 1950.

Robert E. Baker, Notary Public, 214 Dudley Ave., Narberth, Pa., My Commission Expires January 2, 1956 (Notarial Seal).

EXHIBIT A

Development Procedure on Present Television Line

	1949 Sept.	Oct.	Nov.	Dec.	1950 Jan.	Feb.	Mar.	April	May	June	July
Sales Division proposes type and number of models desired for new line July 1950. (Includes tube size, styling, models, tables, consoles, open and with doors, combinations with radio phono., etc.)	X										
Engineering Division specifies the new technical developments which should be completed for inclusion in new line.	X										
Merchandise Division secures engineering specifications for approximate dimensions.	X										
Stylists start preparing design sketches of cabinets desired by Sales Department.	X										
Model Shop starts building samples from design sketches.		X	X	X							
Sample cabinets reviewed by Merchandise Manager and Staff. Models discarded and new ones substituted.			X	X							
Preliminary cost estimates prepared from design sketches and engineering data.				X							
Proposed models presented to Staff of Home Instrument Department. Changes are suggested, models discarded, new models proposed. (of total 61 cabinets completed—18 were accepted).				12/28							
Engineering Division gives preliminary chassis specifications to Purchasing Department.					X						
Purchasing Division gives preliminary metal and plastic cabinet specifications to vendors for tooling.	(Plastic cabinets 6 mos.) (Metals cabinets 5 mos.)				X						
Preliminary cabinet specs on wood cabinets discussed with vendors and raw materials authorized.						X					
Final cabinet drawings scheduled for Engineering approval.						X					
Chassis tooling authorized to vendors on machine parts.	(3 to 4 months)					X					
Material breakdown prepared and sourced with vendors. Purchase Orders prepared and issued.						X	X				
Black Line Drawings scheduled from Engineering to Purchasing.							3/1				
Engineering models produced from components made in Model Shop for testing.								X			
Pre-Production run of chassis built from vendors components.								X			
Field tests made by Engineering Division and Service Company changes recommended.									X		
Quantities determined and prices established.									X		
Production started.									X	X	
Line introduced to Field Sales Organization together with Merchandising and Advertising Plan.										X	
Line introduced to Distributors and orders taken for July, August and September delivery.											7/6
Line introduced to Dealers by Distributors nationally, and announced to public.											

[fol. 943] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

AFFIDAVIT OF JOHN H. MACDONALD

STATE OF NEW YORK,
County of New York, ss.:

JOHN H. MACDONALD, being duly sworn, deposes and says:

1. I am Vice President in charge of Finance and Treasurer of the National Broadcasting Company, Inc. (hereinafter called "NBC"), one of the plaintiffs in the above entitled action. I have read the Complaint and the affidavits of C. B. Jolliffe and Walter A. Buck.

[fol. 944] 2. This affidavit is made in support of plaintiffs' motion for a temporary or interlocutory injunction, and for a temporary restraining order, restraining, enjoining and suspending the promulgation, operation and execution of the Order of the Federal Communications Commission (hereinafter called the "Commission") adopted October 10, 1950, and setting standards for the commercial broadcasting of color television. This affidavit is also made in opposition to defendants' and intervener's motions to dismiss or for summary judgment.

Television Broadcasting Services of NBC

3. NBC was the pioneer in the broadcasting of television programs. On June 29, 1936, NBC began experimental broadcast transmissions of all-electronic black and white television in conjunction with the field testing program of RCA. On April 30, 1939, NBC inaugurated a regular program service to the public on its New York experimental television station. When commercial television operations were authorized by the Commission, NBC began regular commercial television broadcasts over its New York station, WNBT, on July 1, 1941, the effective date of the commercial black and white standards.

4. NBC owns and operates, pursuant to authorization of the Commission, a television broadcasting station in each of the following cities: New York, N. Y., Chicago, Ill., Washington, D. C., Cleveland, Ohio and Los Angeles, Calif.

5. NBC also operates a television network broadcasting business, providing television programs to affiliated stations in 58 other cities throughout the United States.

[fol. 945] 6. NBC has more than 2400 employees engaged in television broadcast activities and estimates that its television broadcast activities provide employment to more than 3700 people who are not employees of NBC.

7. NBC has expended substantial sums of money for the construction of its five television broadcasting stations, for the construction of facilities for its television network operation, and for equipment utilized at its television stations and in its operations. NBC's expenditure for such construction and equipment is more than $8,800,000.

8. In addition to the foregoing expenditures, NBC has made definite and detailed plans for the continuing expansion of commercial television service. These plans have been founded upon the expectation that the number of television receiving sets in the hands of the public would continue to increase in the future as it has in the past.

9. As part of these plans for the expansion of television operations, NBC has entered into commitments with artists and program producers guaranteeing payment of substantial sums of money to such artists and program producers for television programs to be broadcast in the future. Such commitments are in excess of $3,000,000 for the twelve months period September, 1950 through August, 1951.

10. Further, in order to provide plant facilities for its ever-expanding television operations, NBC has entered into lease arrangements guaranteeing payment of substantial sums for the use of theatres and other building space for use as television broadcasting studios. The total financial [fol. 946] commitments involved in such lease arrangements are in excess of $10,000,000.

11. NBC derives all its television revenue from the operation of its own television stations and from the operation of its television network by the sale of time, programs and production facilities to advertisers. Such sales are made to advertisers of products and services who are desirous of having their advertising messages transmitted by television and received in homes and other places.

12. The present black and white television service broadcast by NBC involves expenditures of millions of dollars

a year for time and programs. It is estimated that for the broadcasting industry as a whole, the expenditures for time and programs to provide the black and white television program service now are in the neighborhood of $150,000,000 per year. Part of this cost is borne by television broadcast stations; part by networks; and part by advertisers.

13. The ability of NBC and other broadcasters to sell advertising time on television programs and the amounts that can be charged therefor is primarily dependent upon the number of television receiving sets in the hands of the public capable of receiving such advertising messages and those that can reasonably be expected to be in the hands of the public in the immediate future and the number of viewers of television programs. The number of such sets is what determines the maximum "circulation" which an advertiser may expect. Fundamentally it is circulation and the expectation of its continued increase which makes possible the public's program service.

[fol. 947] 14. During the past four years the number of television receiving sets in the hands of the public has steadily increased. On January 1, 1947 an estimated 15,000 television receiving sets were in the hands of the public. On January 1, 1948 the number was estimated at 200,000; on January 1, 1949 at 1,000,000; on January 1, 1950 at 4,000,000; on October 1, 1950 more than 8,000,000; and as of the effective date of the Order it is estimated that approximately 9,000,000 black and white television receiving sets will be in the hands of the public.

15. NBC's charges to advertisers, and the advertiser's willingness to pay, are based not only on the number of sets outstanding at any particular time, but also upon the increase in the television audience which experience indicates should be experienced in the future.

The Irreparable Injury Resulting From the Order

16. The entire black and white television service has been based upon the fact that each television receiver can receive all television programs and upon the reciprocal fact that each television broadcaster can reach all outstanding television receivers.

17. We have based our plans and made our commit-

ments on the expectation that these facts would continue to be true—that television receivers would continue to receive all programs and that all broadcasters would continue to reach all receivers.

18. The Order now, for the first time, adopts standards for the commercial broadcast of color television programs [fol. 948] which cannot be received, either as color programs or as black and white programs, on the 9,000,000 receivers outstanding as of the effective date of the Order.

19. The effect of the Order is to irreparably injure NBC by depriving NBC of the opportunity to broadcast in color without losing its entire audience. The Commission's Order precludes the public from getting the benefits of a compatible color system and precludes the broadcaster from using a compatible color system.

20. Many advertising clients of NBC desire their programs to be broadcast in color but they do not want to lose their present audience. Color broadcasting without loss of audience cannot be carried on under the Commission's Order. The Commission's action, by denying to NBC the right to employ a compatible system of color television, prevents NBC from accommodating the desires of these advertising clients.

21. The effect of this upon the program service available to the public is very serious. If compatible color broadcasting were permitted, the programs of these advertisers would be available both in color and in black and white. Under the Order, the opportunity of seeing these programs in color is denied to the audience because of the incompatibility of the color standards.

22. Color adds great audience appeal for many products. Without color, television's sales potential cannot reach its fullest growth. If NBC were allowed to broadcast in color without loss of audience, a new field of service to advertisers would be created. Under the Commission's Order, this market is denied to NBC.

[fol. 949] 23. Television competes with other advertising media such as newspapers and magazines. These can use color without loss of audience. The failure of the Commission to approve the compatible system of color television denies to NBC the opportunity to employ color in its popular television programs without loss of audience, and

thus denies to NBC and to television one of the advantages available to other advertising media.

24. Television not only competes with other media for advertiser support; it also competes with other forms of entertainment for the attention of the public. Color adds to the entertainment value of television and therefore contributes to attracting and holding audiences. The failure of the Commission to authorize the use of a compatible system of color television denies to NBC the ability to compete most effectively for its audience. This in turn impairs advertiser support of NBC's television.

25. It is the television channel licensed to the broadcaster which makes it possible for him to carry on business operations. Spectrum space is extremely scarce and the broadcaster, of necessity, must utilize his television channel to the maximum extent possible. The Commission, by the adoption of its Order requires, in effect, that the broadcaster must utilize his television channel either to broadcast black and white programs or, on the other hand, to broadcast color programs. To do both at the same time under the Commission's Order would require two television channels or twice as much space in the spectrum. If the broadcaster had not been deprived of the opportunity to broadcast compatible color television, it would have been possible for him to use one television channel for broadcasting simultaneously to both his present black and white audience and the color television audience.

[fol. 950] 26. If NBC should broadcast incompatible color programs in choice time, it would detract substantially from its revenues. Because the audience for such color programs would be virtually non-existent, little if any revenue would be derived from the program. In addition, NBC would lose the substantial revenue which it had been receiving theretofore from the black and white programs in the choice time.

27. In its development of black and white television broadcasting during the first years of operation, NBC made substantial expenditures in excess of income from television operations. This was necessary in order to present programs of wide appeal which would develop audiences. Advertiser support of these programs was inadequate because there was little or no audience. This course of operation must be repeated if the CBS incompatible system

must be used for broadcasts of color television. On the other hand, if NBC is permitted to broadcast color television on a compatible system it would not have to repeat this process in building up its audience.

28. NBC and other broadcasters may operate their stations only under licenses granted by the Commission which must be renewed from time to time. Their investment, however, must be made on the reasonable expectation that their licenses will be renewed. Without this reasonable expectation of renewal of their licenses, no investments such as are necessary for a television broadcasting service could be made.

29. If the Order is permitted to go into effect NBC and other broadcasters will face the dilemma of broadcasting in color with the incompatible CBS system—with the result-
[fols. 951-958] ing total loss of audience and loss of advertising support and revenue for the periods of such broadcasts—or run the risk that the Commission will attempt to adopt the view that by failing to broadcast in color by the CBS incompatible method the broadcaster has not operated in the public interest and therefore should not have his license renewed.

3. The effect of the Order will thus be either substantially to dilute the television audience on the reasonable expectation of which NBC has made the substantial financial investment and commitments described above, or place the licenses of NBC and other broadcasters in jeopardy, each of which will irreparably injure NBC's television broadcasting business.

John H. MacDonald.

Sworn to before me this 8th day of November, 1950, George J. Higney, Notary Public, State of New York, No. 24-6894500, Qualified in Kings County, Cert. Filed with Kings Co. Clk. and Reg., Cert. Filed with N. Y. Co. Clk. and Reg., Term Expires March 30, 1952 (Notarial Seal)

[fol. 959] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

AFFIDAVIT OF WALTER M. NORTON

STATE OF ILLINOIS,
County of Cook, ss.:

WALTER M. NORTON, being duly sworn, deposes and says:

1. I am President of RCA Victor Distributing Corporation (hereinafter called the "Distributing Corporation"), a corporation organized under the laws and a resident of Illinois, with its principal office at 666 North Lake Shore Drive, Chicago, Illinois. I am familiar with the radio and [fol. 960] television industry in general and with the sale at wholesale of television home receivers in particular.

2. This affidavit is made in support of plaintiff's application for a temporary or interlocutory injunction and a temporary restraining order restraining, enjoining and suspending the promulgation, operation and execution of the Order by the Federal Communications Commission (hereinafter sometimes called the "Commission"), referred to in the Complaint. This affidavit is also made in opposition to defendants' and intervener's motions to dismiss the Complaint or for summary judgment.

Operations of Distributing Corporation

3. The Distributing Corporation is engaged in the sale of television receivers and other products manufactured by the RCA Victor Division at wholesale to dealers through four branch offices located in Chicago, Illinois; Kansas City, Missouri; Detroit, Michigan; and Buffalo, New York. The dealers to whom sales of these products are made by the Distributing Corporation are located in the general wholesale trading areas of those four cities.

4. The principal executives of the Distributing Corporation have their offices in Chicago and the affairs of the Distributing Corporation are managed from here. The Distributing Corporation leases for its use approximately 63,000 square feet of space in buildings in Chicago, for which it pays total annual rentals of approximately $47,000.

5. As of December 31, 1949, the Distributing Corporation had approximately 150 employees in Chicago, and as [fol. 961] of September 30, 1950, approximately 170 employees. The payroll for the calendar year 1949 for Chicago employees was approximately $665,000, and for the nine-month period ending September 30, 1950, approximately $535,000.

6. The annual dollar sales volume of the Distributing Corporation to customers in Chicago amounts to many millions of dollars, and the inventories and fixed assets to maintain these sales operations represent a substantial investment.

Immediate and Irreparable Injury Resulting From the Order

7. The Commission's Order adopting the incompatible CBS color system has been widely discussed in newspapers published in the areas in which the Distributing Corporation does business. In these newspaper articles great stress has been laid on the fact that present black and white receivers will not receive CBS color transmissions even in black and white unless extensive and expensive modifications are made in such receivers. Copies of typical newspaper articles are being separately filed with the Court.

8. On Sunday night at 6:00 P. M. on October 15, 1950 Frank Stanton, President of Columbia Broadcasting System, Inc., went on the air over the CBS network to discourage people from buying present models of black and white television receivers. This was followed by a statement made by Arthur Godfrey during the program "Arthur Godfrey's Talent Scouts" at 8:30 P. M. on October 23, 1950, over the CBS television network advising prospective purchasers of television receivers to "wait about six [fol. 962] months" before buying a television receiver. Both statements were given considerable publicity.

9. At the present time the Distributing Corporation has on hand a substantial inventory of television receivers. The pipe lines of television distribution are customarily kept full—that is the Distributing Corporation supplies the needs of the dealers who sell to the public sufficiently far in advance so that the dealers have a supply of sets

on hand to meet their needs for a period of weeks. The Distributing Corporation does not have firm sales contracts with dealers covering this inventory. Under the generally accepted practice of the industry, the dealers with whom the Distributing Corporation does business are free to refuse to accept delivery of any more television receivers, and the Distributing Corporation is without redress for such refusal.

10. Since the publication of the Commission's Order, retailers supplied by the Distributing Corporation have reported that there has been a softening of the market for present television receivers. Some of these retailers have also reported that they have received cancellations of orders from their customers, who have assigned as the reason therefor the adoption of a color system which cannot be received by the present receivers.

11. This, despite the fact that prior to November 1st when the 10% Federal excise tax went into effect on television sets, dealers bought heavily from distributors and manufacturers. That was done because the excise tax, when it became effective, did not apply to sets in the hands of dealers but only of manufacturers. In addition, the recent imposition of credit controls was responsible for un- [fols. 963-965] usual buying. Notwithstanding both these factors, the falling off of traffic is now beginning to be noticeable.

12. That fact that the Order here authorizes commercial color broadcasting has not been overlooked by dealers who realize that the beginning of "commercial color broadcasting" means a beginning of a business as distinguished from an experimental color service.

13. Increased sales resistance from prospective buyers is being felt. The intended effect of the CBS broadcasting advising people to hold off for six months has been had.

14. It is not possible for the Distributing Corporation to stop accumulating inventory to await public demand since the time lag necessary in large manufacturing operations requires that the Distributing Corporation always order ahead in order to keep a large stock in warehouse here in Chicago.

15. Irreparable injury is also occurring to the Distributing Corporation because it cannot go forward with cer-

tainty to make the commitments that it should for inventory rental space and employment and payroll.

Walter M. Norton.

Sworn to before me this 9th day of November, 1950, James V. Gorman, Notary Public, Cook County, Illinois, My Commission Expires January 28, 1951 (Notarial Seal).

[fol. 966] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

SUPPLEMENTARY AFFIDAVIT OF WALTER M. NORTON—Filed November 9, 1950

STATE OF ILLINOIS,
County of Cook, ss:

Walter M. Norton, being duly sworn, deposes and says:

1. I am President of RCA-Victor Distributing Corporation, one of the plaintiffs herein.

2. The documents to which this affidavit is affixed are copies of the newspaper articles to which reference is made in paragraphs numbered 7 and 8 of my affidavits, filed concurrently herewith, in this cause in support of plaintiffs' application for a temporary or interlocutory injunction and a temporary restraining order and also in opposition to defendants' and intervenor's motions to dismiss the Complaint or for summary judgment.

3. Said documents are true and correct photostatic copies of said newspaper articles and were prepared at my direction and under my supervision.

4. Said newspaper articles were taken from the publications named for the dates stated and were collected and identified at my direction and under my supervision.

Walter M. Norton.

Subscribed and sworn to before me this 9th day of November, 1950. James V. Garman, Notary Public, Cook County, Illinois.

My Commission expires Jan. 28, 1951.

NEWS
BUFFALO, N. Y.
Oct. 12, 1950

FCC Gives Go-Ahead To CBS's Incompatible Color System for TV

By the Associated Press.

WASHINGTON, Oct. 12.—A threat of court action and further major delays hung over home color television today despite an official go-ahead for the Columbia Broadcasting System's method.

The Federal Communications Commission announced late Wednesday that it had made final its previous tentative selection of the CBS system as the national color television plan. CBS immediately promised to "promote (it) to the hilt."

But Isidor Goldberg, president of the Pilot Radio Corporation, said in New York his company will seek an injunction to stay the FCC's action. Declaring that the commission should have delayed the decision for another nine months, Mr. Goldberg said "we very definitely plan injunctive proceedings."

The action also came under fire from the Radio Corporation of America, developer of one competing color TV system ruled out by the FCC. The other was developed by Color Television Inc.

David Sarnoff, chairman of RCA, said the public interest will not be served by forced adoption of a "degraded" and incompatible system.

Unsound, Says Sarnoff

What engineers call the incompatibility of the CBS system is the fact that its color signals cannot be picked up, even in black and white, by existing sets, of which nearly 8,000,000 are in the hands of the public.

"We regard this decision as scientifically unsound and against the public interest," Mr. Sarnoff said. "The hundreds of millions of dollars that present set owners would have to spend and that future set owners would have to pay to obtain a degraded picture . . . reduces the order to an absurdity."

Mr. Sarnoff also hinted that RCA will not accept the FCC decision without a fight, saying:

"Regardless of what anyone else may feel called upon to do, RCA will continue its efforts to advance the bedrock principles on which the sound future of color television can be built and will be built."

In Passaic, N. J., Dr. Allen B. Du-Mont, one of the TV manufacturers opposing the CBS plan, declared that "we don't consider the mechanical receiver practical and we won't manufacture it."

Programs Promised Soon

In effect, the FCC's decision granted Columbia an exclusive franchise in the color television field for its system, based on a mechanical color wheel. CBS has promised to make its color patents available to everyone in the industry. The royalties involved have been estimated at $50,000,000.

In advance of the injunction threat from Pilot, a set manufacturer, CBS President Frank Stanton had expressed confidence that "all segments of the industry will now unite" to get color before the public.

Columbia's new authority is dated to become effective Nov. 20, and Mr. Stanton asserted that within two months CBS will have some 20 hours of color programs on the air each week, much of it networked over the intercity cables.

Mr. Stanton has said that if the set manufacturing industry generally does not respond with production of sets built to receive Columbia color, his company will move to "stimulate interest among businessmen" in a new $50,000,000 company devoted to turning out CBS color receiving equipment.

Incompatibility the Issue

CBS, strictly a broadcaster, reiterated that it does not intend itself to enter the manufacturing field.

Manufacturers who have opposed the CBS system's incompatibility also object that because of the color wheel, CBS color pictures will be limited to screens of 12½ inches or less.

Columbia has countered the incompatibility argument by asserting that existing and future sets may be adapted to receive the color signal in black and white with a gadget costing $15 to $25; and that with an additional $50 to $75 outlay, they can be converted to receive color broadcasts in color. CBS has estimated that brand new CBS color receivers can be retailed for $200 and up, depending upon picture size.

Parallel Systems Violated

The Webster-Chicago Corporation announced in Chicago that it will shortly market devices to adapt present sets. It said adapters to permit black-and-white reception of CBS color signals would sell for about $25 and converters to permit color reception on present sets for $50 to $75. But the company said large-scale production cannot be expected before the first of the year.

Two of the seven FCC Commissioners dissented to the authority given Columbia Wednesday. One, George E. Sterling, objected to "closing the door" on other color systems. Commissioner Frieda B. Hennock wanted to delay a final action until June 1, 1951, to "provide further time for the development of a practical compatible color system."

The FCC is proposing that all black-and-white receivers to be manufactured in the future have a widened tuning range in order to pick up present black-and-white signals and also CBS color signals in black and white. This is recognition of the prospect that color TV and black-and-white TV will probably exist side by side for years to come.

Small Screen Used

Mr. Sterling objected that this FCC proposal was sprung suddenly on manufacturers only last month and noted the almost unanimous response from the set-makers that assembly designs could not be changed quickly.

Mr. Sterling favored a commission-industry conference to discuss the problem and said the FCC majority had "closed the door" on other possible systems, or system improvements, which may come in the future.

CHICAGO DAILY TRIBUNE
CHICAGO, ILL.
Oct. 13, 1950

Color Adapter for Television

(Story in adjoining column)

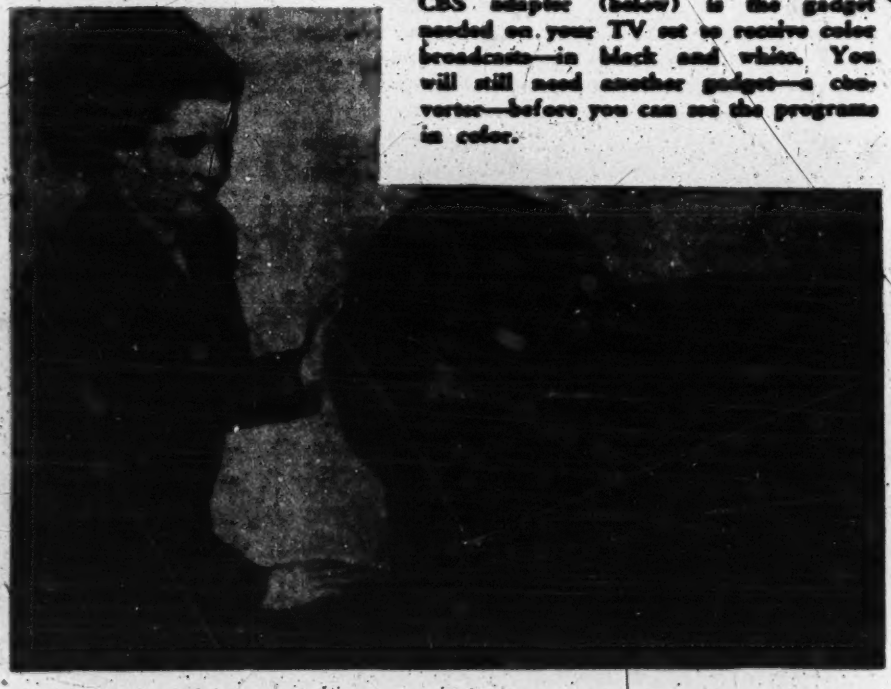


(Associated Press Wirephoto)

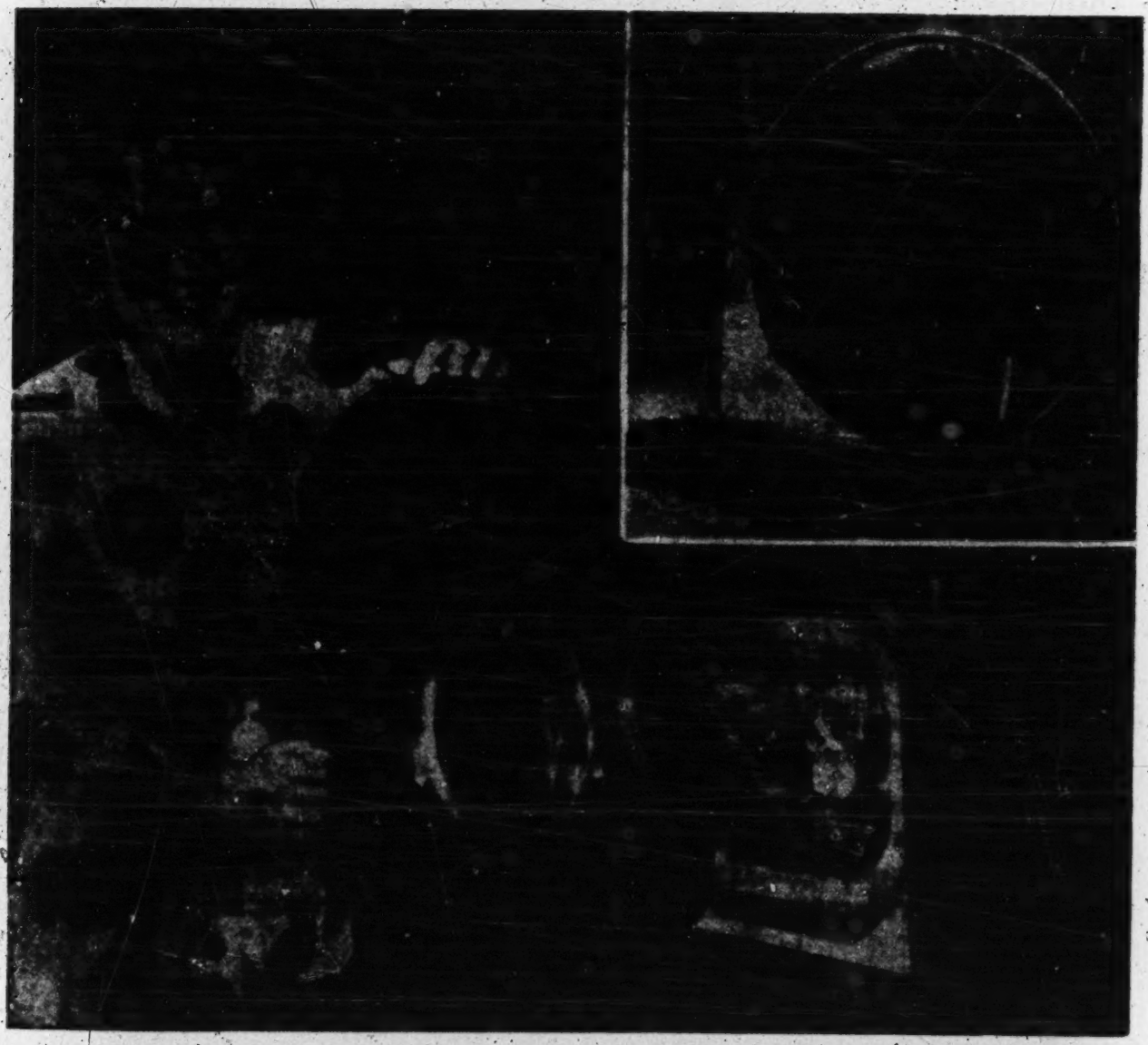
Standard 10 inch television table model set adapted to receive color broadcasts by means of a CBS adapter and coverter. The handle has three positions—for receiving black and white programs, for receiving color programs in black and white, and for receiving color programs in color. Color disk is divided into red, green, and blue segments which spin across the face of the viewing tube.

CHICAGO SUN-TIMES
CHICAGO, ILL.
Oct. 12, 1950

CBS adapter (below) is the gadget needed on your TV set to receive color broadcasts—in black and white. You will still need another gadget—a converter—before you can see the programs in color.



CHICAGO DAILY NEWS
CHICAGO, ILL.
Oct. 12, 1950



TV COLOR CONVERTER that will be produced by Webster Chicago Corp. is adjusted before a television screen by Rosemary Lynch. This equipment, an experimental laboratory model, would enable present sets to receive color, according to the manufacturer. It is made to slide away from the set when black and white is desired. Circuit changes in the set are necessary before color pictures can be received clearly. Inset is the color disk that whirls in front of the picture tube.

620

TIMES
DETROIT, MICH.
Oct. 12, 1950

Color TV of CBS Gets U.S. Approval

WASHINGTON, Oct. 12 (INS)—The color television system developed by the Columbia Broadcasting System was formally approved as standard for the industry yesterday by the Federal Communications Commission, which set Nov. 20 as the date commercial color TV can go on the air for the general public.

The FCC decision to adopt CBS's color plan on a nationwide basis came over staunch opposition from leading segments of the television industry.

In backing up its tentative decision of Sept. 1, the FCC reiterated that color systems developed by the Radio Corp. of America and Color Television, Inc., fall short of the commission's standards.

Isidor Goldberg, president of the Pilot Radio Corp., said in New York his firm would seek an injunction to stay the FCC's action.

Manufacturers took a dim view of CBS color and claimed it cannot be received on the existing 8,000,000 black-and-white sets throughout the nation.

On the other hand, the manufacturers said that RCA and CTI systems are compatible. The set makers said that production of new sets incorporating the CBS system would probably shoot up set costs by $40 to $100 merely to receive CBS color in black and white.

But the Webster-Chicago Corp. announced in Chicago that it would shortly market devices to adapt present sets. It said adapters to permit black and white reception of CBS color signals would sell for about $25 and converters to permit color reception on present sets for $50 to $75.

The company said large-scale production could not be expected before the first of the year.

The FCC scheduled a hearing at an undetermined later date to consider the views of those manufacturers who might wish to produce only black-and-white sets.

CBS hinted in the recent FCC hearings it was prepared to enter into manufacturing of new color sets if its system were adopted.

RCA's petition to delay the color decision and CTI's plea to reopen FCC hearings were turned down simultaneously with yesterday's order.

Indications are that the nation's manufacturers will require several months to change production lines in order to turn out sets to receive the CBS color telecasts if they desire to produce them at all.

Among the mounting opposition received by FCC from industry was a charge by the Philco Corp. that the FCC exceeded powers granted it by Congress in asking manufacturers to comply with the then proposed adoption of CBS color because the system was incompatible.

970

CHICAGO DAILY NEWS
CHICAGO, ILL.
Oct. 12, 1950

What Battle Over Color TV Means to You and Your Set

Station WBKB To Use Method

BY JACK MABLEY

The lines were being drawn today for a mighty propaganda assault on the American people over color television.

On one side was the Columbia Broadcasting System, which Wednesday won FCC approval for commercial operation of its color system.

On the other side was the Radio Corporation of America and about 80 per cent of the nation's TV receiver manufacturers, who are strongly opposed to the CBS system.

• • •

THE FIRST step in the battle will be in court. RCA or some other manufacturer is expected momentarily to seek a court order nullifying the FCC decision. A temporary injunction will be sought first, then a permanent injunction.

CBS, meanwhile, unless it is halted by court order, will begin putting color programs on the air in New York.

They also will give any other broadcaster permission to use their system for transmitting color, in return for payment of royalties.

• • •

STATION WBKB said Thursday it may put CBS color telecasts on the air late next month.

WBKB, an independent station, is the Chicago outlet for CBS TV programs. The station was waiting Thursday to hear from CBS.

A spokesman said he believes the network will want to make Chicago a key outlet for color telecasts. He said that WBKB has no plans to originate color telecasts, and will telecast only shows that come over the coaxial cable.

• • •

THE COLOR telecasts would have to be during daytime, and on a very limited basis, because the station is almost sold out on its afternoon and evening programming.

The other stations, WENR-TV, WGN-TV and WNBQ, have no plans for color telecasting.

CBS lost no time in beginning its publicity barrage for its color system. Arthur Godfrey, the network's most potent salesman on both radio and TV, devoted much of the time on his network radio show Thursday morning talking about the CBS color.

Frank Stanton, president of the network, sat in the control room throughout the broadcast.

The big question is, who will be watching the color telecasts? Set manufacturers are dead set against retooling and converting their plants for color sets and for gadgets that would enable present sets to receive color.

• • •

ONE MANUFACTURER so far has announced it will produce color converters. Webster-Chicago Corp., which has been working with CBS, said it plans to market converters around the first of the year.

The opposition of the [redacted] the manufacturers is not based on love for RCA or disdain of CBS. It is based on self-interest. They feel that the CBS [redacted] is inferior.

They feel that other systems now being developed will be superior. The RCA color system, which RCA claims will be perfected within a year, would put on the air a picture that could be picked up by any present set in black and white, with no changes whatever in the set.

• • •

IF YOU OWN a TV set, and CBS color telecasts began in your city, here is how you would be affected:

Your set in its present state would not pick up the color telecasts.

If and when manufacturers make an adapter available, for somewhere between $15 and $50 you could buy an adapter, attach it to your set, and pick up the color telecasts in black and white. The picture would be inferior to your present picture. It would be more coarse.

• • •

FOR AN additional $80 to $150, you could buy a converter to attach to your set, which would bring in the color picture.

The converter is a round, transparent color disc, which would be synchronized to whirl in front of your present picture tube.

If you have a 16-inch picture tube, the color disc would be about 25 inches in diameter.

An alternative would be to purchase a new color receiver. CBS has estimated the price at a minimum of $200, but manufacturers say that is completely unrealistic, and talk in terms of $400 or $500.

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622

NEWS
DETROIT, MICH.
Oct. 12, 1950

Color TV Delay Due as FCC Rules for CBS Plan

WASHINGTON, Oct. 12.—(AP)—A threat of court action and further major delays hung over home color television today despite an official go-ahead for the Columbia Broadcasting System's method.

The Federal Communications Commission (FCC) announced late Wednesday that it had made final its previous tentative selection of the CBS system as the national color television plan. CBS immediately promised to "promote it to the hilt."

But Isidor Goldberg, president of the Pilot Radio Corp., which manufactures TV sets, said in New York that his firm will seek an injunction to stay the FCC's action. Declaring that the commission should have delayed the decision for another nine months, Goldberg said "we very definitely plan injunctive proceedings."

RCA ALSO OBJECTS

The action also came under fire from the Radio Corporation of America (RCA) developer of one competing color TV system ruled out by the FCC. The other was developed by Color Television, Inc.

David Sarnoff, board chairman of RCA, said in New York that the public interest will not be served by forced adoption of a "degraded" and incompatible system.

What engineers call the incompatibility of the CBS system is the fact that its color signals cannot be picked up, even in black and white, by existing sets, of which nearly 8,000,000 are in the hands of the public.

"We regard this decision as scientifically unsound and against the public interest," Sarnoff said. "The hundreds of millions of dollars that present set owners would have to spend and that future set owners would have to pay to obtain a degraded picture [illegible] red as today's order to an absurdity."

Sarnoff also hinted that RCA will not accept the FCC decision without a fight, saying:

"Regardless of what anyone else may feel called upon to do, RCA will continue its efforts to advance the bedrock principles on which the sound future of color television can be built and will be built."

In effect, the FCC's decision granted Columbia an exclusive franchise in the color television field for its system, based on a mechanical color wheel. CBS has promised to make its color patents available to everyone in the industry. The royalties involved have been estimated at $50,000,000.

In advance of the injunction threat from Pilot, Frank Stanton, CBS president, had expressed confidence that "all segments of the industry will now unite" to get color before the public.

SET NETWORK PROGRAMS

Columbia's new authority is dated to become effective Nov. 20, and Stanton asserted that within two months CBS will have some 20 hours of color programs on the air each week, much of it networked over the intercity cables.

Stanton has said that if the set manufacturing industry generally does not respond with production of sets built to receive Columbia color, his company will move to "stimulate interest among businessmen" in a new $50,000,000 company devoted to turning out CBS color receiving equipment.

CBS, strictly a broadcaster, reiterated that it does not intend to enter the manufacturing field itself.

Columbia has countered the incompatibility argument by asserting that existing and future sets may adapt to receive the color signal in black and white with a gadget costing $15 to $25; and that with an additional $50 to $75 outlay, they can be converted to receive color broadcasts in color.

CBS has estimated that brand new CBS color receivers can be retailed for $200 and up, depending on picture-size.

Manufacturers object that because of the color wheel, CBS color pictures will be limited to screens of 12½ inches or less.

2 ON FCC DISSENT

In order to carry out its decision, FCC is proposing so-called "bracket standards" for televising — that is, one standard for present black and white, and another for CBS color.

It is proceeding on the assumption that set makers will redesign future receivers to pick up both. Most of the manufacturers say this cannot be done until sometime next year.

Two of the seven FCC commissioners dissented to the authority given Columbia. One, George E. Sterling, objected to "closing the door" on other color systems. Commissioner Frieda B. Hennock wanted to delay a final action until June 30, 1951, to "provide further time for the development of a practical compatible color system."

The FCC's long-range schedule calls next for consideration of allocating new television channels and for eventual lifting of the freeze on new TVA stations which has been in effect for more than three years. Indications are, however, that the freeze will not be lifted until well into 1951.

STAR
KANSAS CITY, MO.
Oct. 12, 1950

A FUROR ON TV COLOR

INJUNCTION WILL BE SOUGHT AGAINST FCC DECISION.

Pilot Film Corporation and R. C. A. Demand Exclusive Use of Columbia Method Is Unfair to Public.

Washington, Oct. 12 (AP).—A flurry of court action and further major delays hung over the color television today despite an official go-ahead for the Columbia Broadcasting System's method.

The Federal Communications commission announced late yesterday that it had made final its previous tentative selection of the C. B. S. system as the national color television plan. C. B. S. immediately promised to "promote (it) to the hilt."

Decision Too Hasty.

But Isidor Goldberg, president of the Pilot Radio corporation, said in New York his firm will seek an injunction to stay the FCC's action. Declaring that the commission should have delayed the decision for another nine months, Goldberg said "we very definitely plan injunctive proceedings."

The action also came under fire from the Radio Corporation of America, developer of one competing color TV system ruled out by the FCC. The other was developed by Color Television, Inc.

David Sarnoff, board chairman of R. C. A., said in a statement issued in New York that the public interest will not be served by forced adoption of a "degraded" and incompatible system.

What engineers call the incompatibility of the C. B. S. system is the fact that its color signals cannot be picked up even in black and white, by some 8 million existing sets already sold.

Scientifically Unsound.

"We regard this decision as scientifically unsound and against the public interest," Sarnoff said. "The hundreds of millions of dollars that present set owners would have to spend and that future set owners would have to pay to obtain a degraded picture . . . reduces today's order to an absurdity."

Sarnoff also hinted that R. C. A. will not accept the FCC decision without a fight, saying:

"Regardless of what anyone else may feel called upon to do, R. C. A. will continue its efforts to advance the bedrock principles on which the sound future of color television can be built and will be built."

In effect, the FCC's decision granted Columbia an exclusive franchise in the color television field for its system, based on a mechanical color wheel. C. B. S. has promised to make its color patents available to everyone in the industry. The royalties involved have been estimated at 20 million dollars.

Set to Make Adapters.

The Webster-Chicago corporation announced in Chicago that it will shortly market devices to adapt present sets. It said adapters to permit black and white reception of C. B. S. color signals would sell for about $25 and converters to permit color reception on present sets for $30 to $75. But the company said large-scale production cannot be expected before the first of the year.

In order to carry out its decision, FCC is now proposing so-called "bracket standards" for television—that is, one standard for present black and white, and another for C. B. S. color. It is proceeding on the assumption that set-makers will redesign future receivers to pick up both. Most of the manufacturers say this cannot be done until sometime next year.

RETAILING DAILY
NEW YORK, N. Y.
Nov. 3, 1950

Blame Color for Dip In Kansas City Sales

KANSAS CITY, Nov. 2.—Sales of television sets continue to sag, although action has not quite stopped completely. Retailers are inclined at present to blame the color controversy more than any other single factor in public resistance to buying.

It is admitted that the huge volume done during the third quarter undoubtedly provided for the needs of the majority of ready customers, and that credit controls have put some people out of the market. Retailers do not expect a large-scale pick-up in business until the beginning of Christmas selling.

624

CHICAGO DAILY TRIBUNE
CHICAGO, ILL.
Oct. 14, 1950

VIDEO SHARES FALL ON FIGHT OVER COLOR TV

Losses Run to as Much as 2 Points

15 MOST ACTIVE STOCKS

(Figures after decimal point are eighths)

Shs.	Stock	Close	Net chg.
46,500	El Paso Nap	11.1+	.3
46,400	N Y Central	17.3+	.1
38,300	Ram Rand	14.2—	.1
33,000	North Pac	37.3+	.4
31,400	River Rad & Fu	16.6+	.1
30,400	Radio Corp	18.2—	.2
19,700	Studebaker	28.6+	.4
18,100	Penn RR	20.3+	.1
17,000	Gen Motors	63.3+	.1
17,000	Sunray Oil	15.5	....
16,600	Leh Val RR	10.2+	.2
16,000	Chi M St P & Pac	17.1	....
15,700	Socony Vac	24.3+	.2
15,300	Am Cab & Rad	8.6+	.2
15,000	Am Rad & Std San	13.0	....

New York, Oct. 13 (AP)—Electronics shares took a thumping today in the stock market in the midst of a confused controversy over color television. Losses in that division ran to as much as 2 points a share and the only two minus signs in the list of 15 most active issues resulted from the color TV argument.

The radio-TV group headed lower from the start of the session on the strength of the decision Wednesday by the federal communications commission that the television industry must adopt the color TV system developed by the Columbia Broadcasting system. The order has brought wide protests from manufacturers.

Heads Downward Later

The two CBS common issues headed upward immediately along with Remington Rand which holds a contract for making CBS color equipment. The remainder of the market was comfortably higher at this time, too. By midday the whole market headed lower and with it went CBS and the others in the electronics group.

CHGO. HERALD-AMERICAN
CHICAGO, ILL.
Oct. 13, 1950

TV Shares Lead Slow Mart Drop

NEW YORK, Oct. 13.—(AP)—A slow decline today in the stock market smothered an early mild recovery movement.

Overall there was a mixed price pattern that extended from extremes of 2 points lower to 3 higher.

The volume of trading came to an estimated 2,000,000 shares. It was noted that business slowed down immediately on price recessions.

Radio-television issues took the worst of the set-back in the midst of industry protests over the Federal Communication Commission's order to start CBS color television broadcasts.

Newsprint companies got strength from a $10 a ton price increase announced by the Powell River Co. in Vancouver. International Paper and St. Regis made good gains.

Distillers tacked on fractions to more than a point, with Hiram Walker in the lead.

Lower were Admiral Corp., Philco, Radio Corp., Zenith, Motorola, CBS, Chrysler, Kennecott Copper Allied Chemical, Du Pont, American Can, Coca Cola, Santa Fe, Union Pacific and American Tobacco.

Higher were Studebaker, Goodrich, Schenley, Distillers Corp.-Seagrams, Safeway Stores, American Woolen, Nickel Plate, Northern Pacific and Twentieth Century-Fox.

CHGO. DAILY NEWS
CHICAGO, ILL.
Oct. 13, 1950

Most of TV Issues Sag; Distillers Up

NEW YORK—(AP)—There was a suggestion of higher price tendencies Friday in the stock market, but the gain showed as far as it got.

There was a thorough mixture of quotations running from a few cents lower to as much as $2 higher at the outside.

Most of the radio-television manufacturing issues started out lower, reflecting dissatisfaction with the Federal Communications Commission order giving the go-ahead to the Columbia Broadcasting System's method of color television.

• • •

CBS ISSUES headed higher by contrast, but within a comparatively short time they turned down with the rest of the radio-TV group, although CBS doesn't make sets.

Remington Rand, with a contract to make CBS color equipment, moved a little higher.

CHICAGO DAILY TRIBUNE
CHICAGO, ILLINOIS
Oct. 14, 1950

COLOR TV FIGHT CUT SALES OF TELEVISION SETS

Orders Are Canceled by Confused Public

New York, Oct. 13 (AP)—A confused public slowed its television set buying today as it groped for answers to the color television controversy.

A spot check across the nation by the Associated Press showed set sales had been curtailed moderately to sharply in many places since approval Wednesday of the Columbia Broadcasting System's color method by the federal communications commission.

In some places, dealers reported sales remained normal.

One informed source here said there had been heavy cancelations by customers of their orders with dealers and also of dealers' orders with distributors. This source said many dealers had stocked up heavily in anticipation of a buying rush to beat the 10 per cent federal tax on television sets that goes into effect Nov. 1.

Seek to Reassure Public

Many, however, expressed belief that once the public realized all the present black and white programs would continue and that color telecasts would be supplementary and at hours outside normal programming, sales would return to normal. Both sides sought to reassure the public on this score even as more manufacturers fired blasts at CBS color and CBS retorted hotly to some of the statements.

Much of today's controversy centered about statements by Robert W. Galvin, executive vice president of Motorola, Inc., of Chicago, at a news conference here.

Galvin said that to adapt a present type set to receive even black and white pictures from CBS color telecasts involved a major rewiring job on the set. He said it was of such magnitude it would void the underwriters' approval of the set as being free from fire hazard, and might complicate insurance claims in the event of fire originating in the set.

Cites Size of Task

CBS replied, "You can always make a fire hazard out of a set if you want to by not servicing it properly, but if the service man follows the manufacturers' instructions there should be no hazards in the changes needed to adapt sets to the CBS system."

Galvin said the rewiring necessary to adapt a set to the CBS system was so great it would overwhelm the facilities of the nation's service companies if they attempted to adapt the 8 million sets in use.

CBS said it had demonstrated to the FCC a plug-in adapter in which no internal rewiring of the set was necessary.

Galvin predicted the CBS color system would fail for lack of public interest and acceptance. CBS said it had received thousands of inquiries from persons wanting to know how soon they could get color and from service men wanting detailed instructions for converting sets, as well as inquiries from some manufacturers on how to produce color sets.

"Rube Goldberg System"

Galvin said that while from an engineering standpoint, sets with tubes of 16 and 19 inches diameter could be converted to receive color, it was a practical impossibility. CBS retorted it had converted sets of that size for color without great difficulty.

More criticism was directed at the motor driven spinning disk which the CBS system uses in its present form to produce color. Set maker F. A. D. Andrea called it a "Rube Goldberg mechanical system." Galvin said a disk big enough to produce color on a large screen set would look like a ferris wheel. Michael Kaplan, president of Sightmaster corporation and of an association of smaller manufacturers, said adoption of the system had created "a chaotic manufacturing wilderness" in which CBS had no money invested since it did not make sets.

Attorneys for Isador Goldberg, president of Pilot Radio corporation, who had said he would seek an injunction against the color action, issued a statement saying suit would be started sometime next week.

626

MORNING WALL ST. JOURNAL
NEW YORK, N.Y.
Oct. 14, 1950

Television

Official Okay on Color Brings a Sales Tumble On Standard TV Sets

Many Dealers Say Business "Dries Up," and Order Cancellations Hit Makers

Plans to Broadcast Readied

BY JOSEPH M. GUILFOYLE

Color television is making it tough to sell plain old black-and-white TV receivers.

Retailers in several cities report that sales have practically dried up as consumers rush to the sidelines to await the appearance of shiny new color sets.

Laments a Pilot TV set dealer in the nation's capital:

"Everything just stopped dead yesterday. I sold exactly one receiver. Normally I'd get rid of 30 to 50 in a day."

In Los Angeles, Carl Reiman, proprietor of the Reiman Appliance firm, states:

"Just as we were expecting a big rush for TV sets to beat the excise taxes (a 10% levy will be effective November 1) the bottom dropped out of the video market. Color television probably is the biggest factor."

Another retailer in the movie city confirms that "the color television story definitely is slowing things up."

In New York, several dealers noted a drop in sales; in some instances consumers cancelled orders for receivers placed earlier.

In Chicago, Joseph Wolff, president of the Illinois Radio & Television Co., says sales are off 50% this month and "the main reason has been the threat of color television. People want to wait for color now that there's been so much talk about it."

An appliance store manager in San Francisco reports that several buyers called up the morning after the color TV decision and cancelled orders they had placed for black-and-white receivers. "Apparently they want to wait and see what will happen," he adds.

Some retailers are getting panicky, too.

One of the largest radio and appliance chains in the east yesterday cancelled all its outstanding orders with video set makers. Says an official:

"The cancellation affected quite a few thousand receivers and covered practically every standard brand, including R.C.A., Emerson, Admiral, Motorola, Philco and Hallicrafters sets."

Confusion and Cancellations

In Chicago, the Du Mont distributor reported that some dealers have cancelled orders because of the confusion tinted video has created. Illinois Radio & Television Co.'s Mr. Wolff states he is cutting down on orders to suppliers of unknown brands.

"From now on I'm going to stick to the standard makes," adds Mr. Wolff.

John Hughes, sales manager of the Windy City's Yahey Television Sales firm, reports: "We're holding down on our orders to distributors, mainly because we have heavy inventories. We've stopped telling suppliers to send all they can."

Benjamin Abrams, president of Emerson Radio Phonograph Corp., revealed that some New York dealers have cancelled orders, but added that the "amount involved was not large enough to even dent our big backlog of unfilled orders."

Call to "Hold Up"

A spokesman for the General Electric Supply Corp. in New York said it had been told by several stores to "hold up on delivery of any more TV sets until things clear up."

An official of one of the country's largest department stores served notice on set makers yesterday, including Zenith, Emerson and Philco, that he is going to be more selective when ordering sets in the future. He warned them he may cancel all orders, if sales go into a tailspin.

This retailer also warned manufacturers not to ship him any more samples of new models without first discussing them with him. In the past set-makers shipped samples of new models so they could be displayed for consumer reaction.

NEW YORK WORLD-TELEGRAM
NEW YORK, N.Y.
Oct. 16, 1950

Decorating Problem In New Color TV



Eugene Stephenson, above, ponders the decorating problems presented by a new color television converter set up in offices of the Columbia Broadcasting System. "This," he remarked "is going to cause a great deal of confusion."

By JOAN GAHAN.

Consternation over the Columbia Broadcasting System's color television method spread today to the aesthetically minded 400 of the decorating world.

"The new color television converter bears a strong resemblance to Dead Eye Dick caught yawning," pronounced Dan Cooper, fabric and furniture designer, after one look at a standard TV receiver fitted with color conversion equipment.

"It's a fantastic looking contraption, isn't it?" asked decorator Alex Macdonald.

These and other spontaneous comments from the men and women who will be designing rooms around converted television models of the future have nothing to do with the relative merits of color television methods considered by the Federal Communications Commission.

Concerned with Looks.

The FCC approval of the CBS color television system has provoked discussion, debate and in some cases downright harsh words among manufacturers and distributors of TV sets.

Decorators are more concerned with the appearance of sets converting for color.

Conversion equipment originated by CBS includes an adapter and a color converter. The adapter, which enables a standard set to receive color programs in black and white, is housed in a small box connected to the set by an electrical cord. The color converter, with its large metal disc and transparent screen, is necessary for the reception of color programs in color.

It's That Converter.

It's the converter that's causing all the dither among decorators, who until now have been more absorbed in the placement than in the disguise of television sets.

After recovering from the initial visual surprise presented by the new attachments, the decorators put on their thinking caps and came up with a series of ingenious but practical suggestions for future home use of color television.

Painting both set and attachments the same color as the wall backing them is an idea shared by decorators Eugene Stephenson and Ellen Lehman McClumbey. Both feel that this would keep the set from being a sore thumb in an otherwise co-ordinated room scheme.

An alternate suggestion from Mrs. McClumbey is in line with the "hide or cover-up" school of thought.

"If you put the set in a corner, you can hinge an ordinary standing screen to the wall at one side and pull it across when the set is not in use."

Such a screen should clear the floor by a good inch, she said.

Would Hide It.

Alden Conway, who has designed interiors for Gertrude Lawrence and Tallulah Bankhead, believes the conversion to color television should be treated with an eye to permanence. He envisions a recess in the wall for the television set. He would put a hidden slot on one side to hold the converter when it is pushed away from the set for a program in black and white.

Probably the only designer who has already set to work preparing for color television is Phillip La Tour, designer and manufacturer of custom-built television cabinets. Conversion equipment, costing between $75 and $100, cannot be used on cabinet television models, Mr. La Tour said. Owners of cabinet models will have to be content with black and white television or invest in a new cabinet specifically designed to hold their present set and the attachments.

628

RETAILING DAILY
NEW YORK, N. Y.
Oct. 16, 1950

Converting Present TV Sets To Color Termed Fire Hazard

Holds Change Would Cancel Underwriters Laboratory Authorization, Leaving Owner Unable to Collect Insurance

Adapting or converting present television receivers can constitute one of the most formidable hazards in the home, Robert W. Galvin, executive vice-president, Motorola, Inc., stated Friday.

Almost all sets made by a reputable manufacturer are approved by Underwriters Laboratory, he said, and any major or significant change made inside the set after it leaves the factory automatically voids the UL approval.

This does not refer to the normal servicing procedures by a serviceman like changing a miniature tube, or replacing a resistor. But a change like adapting and/or converting a set to color would cancel the UL authorization thereby leaving the consumer wide open for damage without recourse, he pointed out.

Unable to Collect Insurance.

If, through the adaptation, the set's wiring is left in a faulty condition and a fire is started in the home, the consumer will not be able to collect his insurance since the appliance which started the fire was not UL approved.

Mr. Galvin pointed out that it is not possible to adapt a set to Columbia Broadcasting standards by merely adding a box. The set must be rewired internally, and the factories do not have the facilities to do the job. In fact, he added, to convert the millions of sets now in the hands of the public becomes a "practical impossibility."

Motorola will continue to make present monochrome receivers and has no plans at present to make any other kind, he stated. In order to state the company's position in regard to color, Motorola will initiate a tremendous campaign using various media, he remarked.

Holds System Too Complex.

Mr. Galvin feels that when the public understands the facts on CBS color, the impracticability will become apparent to everyone and will never become a part of the American home. It will fail, he said, because of its own lack of merit.

The complexities in putting this system into operation will keep the public from ever allowing it to reach the mass production stage, he said.

He concluded by saying: "There is only one satisfactory answer to this problem—that the FCC will review the advances which have been made in the development of color television since the time it closed its hearing on that subject last May. If this is done, it is possible that, after due consideration the FCC may allow a compatible system for television to be authorized which will allow for a normal, gradual transition to color in the future.

NEW YORK NEWS
NEW YORK, N.Y.
Oct. 16, 1950

CBS President Hurls Television Bombshell!

By BEN GROSS

Consternation swept the television industry last evening, following an address by Frank Stanton, president of the Columbia Broadcasting System, in which he advised the public, "If you wait for, say, six months (before buying a black-and-white video set), you may save some money."

Speaking over the CBS [illegible] at 6 P. M., Stanton said that by [illegible] which will enable you to get [illegible] color."

Stanton's talk, designed to explain the CBS color system and to answer its critics, created a furor among manufacturers and dealers. The latter are already reeling from the sudden drop in sales which followed last week's decision by the Federal Communications Commission adopting the CBS color method as the national standard.



Frank Stanton

postponing the purchase of a TV receiver, "you will have a self-contained set with built-in compatibility and built-in color. On the other hand, if you buy an ordinary black-and-white set now, you will be able to enjoy the black-and-white programs being broadcast. But if you do buy such a set, buy only from a manufacturer who will give you positive assurance that there will soon be adapters and converters

Barred From Meeting.

The CBS president also revealed during his address that representatives of his network have been barred from a special meeting called by the Radio Television Manufacturers' Association, sched-

(Continued on page 41, col. 1)

Televiewing

CBS Chief Hurls Bombshell at TV

(Continued from page 35)

uled for 10 A. M. today at the Hotel Roosevelt, at which the organization's attitude toward color TV will be considered. Stanton had asked for such representation but said, "This morning I received a telegram stating the meeting would be closed to us."

"If any statements come out of that meeting," he added, "I hope you will read them in the light of these facts. We do not want the future of color television to fall into the hands of any self-appointed group, meeting in secret behind closed doors. . . . We intend to do everything we can to prevent anyone . . . from blocking color television and keeping it from the American public."

Stanton emphasized that "if you own a black-and-white television set, it will not become useless overnight when color broadcasting begins." This, he pointed out, because color programs will merely "increase at an orderly rate as the number of sets capable of receiving them increases." Furthermore, he said, most of the popular black-and-white programs will continue to be broadcast in black-and-white until a large percentage of sets are capable of receiving color.

To Buy or Not to Buy.

On the question of whether to buy a black-and-white set at this time, Stanton refused to give a flat answer.

"But I can give you some facts which may help you to make up your mind," he said. Calling attention to the circumstance that most sets now on the market can be adapted to receive color pictures on [illegible] and that [illegible] can be [illegible] to receive broadcasts in color, he added:

"Therefore, if the manufacturers give you their word that there will soon be available adapters and converters for the particular black-and-white sets which you are considering, you will have protection against obsolescence.

"On the other hand, I want to point out that it will be somewhat cheaper and more satisfactory to buy a black-and-white set which is already adapted, so that it has built-in compatibility. Furthermore, a new combination color and black-and-white set may be somewhat less expensive and will be more satisfactory than an ordinary black-and-white set adapted and converted for color.

"Therefore, if you will wait, say, six months, you may save some money and you will have a self-contained set with built-in compatibility and built-in color."

Announcing again that in less than two months CBS will be broadcasting 20 hours of color programs each week, Stanton then proceeded to answer the criticisms of CBS' system voiced by the majority of manufacturers. He said that every objection raised against it had already been answered at the FCC hearings.

630

JOURNAL
RAPID CITY, S. D.
Oct. 16, 1950

Video Buyers Told To Wait Six Months

New York, Oct. 16—(AP)—Frank Stanton, president of the Columbia Broadcasting System, said last night that television set buyers "may save some money" by waiting up to six months until manufacturers convert to the CBS color video process.

Stanton spoke over his own network in defense of Columbia's system, which has been attacked for various reasons by a large part of the industry.

Despite opposition, however, it recently won the approval of the federal communications commission in a split decision.

What effect Stanton's advice would have on the TV set market—already nervous after the FCC ruling—remained to be seen.

Stanton revealed some of the contention that is sweeping the industry by disclosing that CBS has been barred from a special meeting called for today by the Radio-Television Manufacturers association to discuss color TV.

The CBS system has been strongly opposed by the Radio Corporation of America—which is working on a method of its own—and by a majority of set makers.

Stanton said the 7,000,000 black and white sets now in use will not become obsolete as soon as color TV starts.

He said most present sets can either be "converted" to full color use, or "adapted" to receive color programs in black and white.

Further, he suggested that buyers now get sets only from companies that promise to have converters and adapters available.

The color programs were scheduled by the federal communications commission to begin Nov. 20, but may be delayed by lawsuits protesting the ruling.

David Sarnoff, board chairman of RCA—owner of Columbia's powerful rival, NBC—called the FCC decision "an absurdity."

As the television committee of the Radio-Television Manufacturers association began its meeting here, a spokesman said it probably would be late in the day before any action or statement was forthcoming.

The association turned down Stanton's request to have a CBS representative present on the grounds that it was a closed meeting, and CBS was not a member of the association and not a television manufacturer.

HERALD
GLOVERSVILLE, N. Y.
Oct. 17, 1950

STANTON ADVISES 6-MONTH WAIT FOR COLOR VIDEO

NEW YORK—(AP)—Frank Stanton, president of the Columbia Broadcasting System, said Sunday night that television set buyers "may save money" by waiting up to six months until manufacturers convert to the CBS color video process.

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Nervous Market

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"If any statements come out of that meeting, I hope you will read them in the light of these facts," Stanton said to the public.

Secret Meeting

"We do not want the future of television to fall into the hands of any self-appointed group, meeting in secret behind closed doors. We intend to do everything we can to prevent any one from blocking color television and keeping it from the American public."

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PRESS
ASBURY PARK, N.J.
Oct. 16, 1950

Wait for Color, TV Buyer Told

NEW YORK, (AP)—Frank Stanton, president of the Columbia Broadcasting system, said last night that prospective television set buyers "may save some money" by waiting up to six months until manufacturers convert to the CBS color video process.

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Stanton said the 7 million black and white sets now in use will not become obsolete as soon as color TV starts.

He said most present sets can either be "converted" to full color use, or "adapted" to receive color programs in black and white.

Further, he suggested that buyers now get sets only from companies that promise to have converters and adapters available. Lastly, he said it might be wiser to "wait say six months" until such attachments can be built in.

The color programs were scheduled by the Federal Communications commission to begin Nov. 20 but may be delayed by lawsuits protesting the ruling.

TIMES
ST.CLOUD, MINN.
Oct. 2, 1950

TV Buyers Urged To Delay Buying For Color Video

New York (AP)—Frank Stanton, president of the Columbia Broadcasting system, believes that television set buyers "may save some money" by waiting up to six months until manufacturers convert to the CBS color video process.

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David Sarnoff, board chairman of RCA—owner of Columbia's powerful rival, NBC—called the FCC decision "an absurdity."

REPOSITORY
CANTON, OHIO
Oct. 16, 1950

CBS President Tells Buyers To Wait for Video Color Sets

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TIMES
SCRANTON, PA.
Oct. 16, 1950

Wait for Color, CBS Tells Public

6-Month Delay Urged—Industry Calls Parley

NEW YORK (AP)—Frank Stanton, president of the Columbia Broadcasting System, said last night that television set buyers "may save some money" by waiting up to six months until manufacturers convert to the CBS color video process.

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NEW YORKER
POUGHKEEPSIE, N. Y.
Oct. 16, 1950

Public Asked to 'Wait 6 Months' For CBS Color Video Process

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NEWS
KINGSPORT, TENN.
Oct. 17, 1950

CBS President Warns TV Buyers Of Possible Savings

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He said most present sets can either be "converted" to full color use or "adapted" to receive color programs in black and white.

Further, he suggested that buyers now get sets only from companies that promise to have converters and adapters available. Lastly, he said it might be wiser to "wait say six months" until such attachments can be built in.

The color programs were scheduled by the Federal Communications Commission to begin Nov. 20, but may be delayed by lawsuits protesting the ruling.

JERSEY JOURNAL
JERSEY CITY, N. J.
Oct. 16, 1950

Urges Delay In TV Buying

NEW YORK (AP)—Frank Stanton, president of the Columbia Broadcasting System, said last night that television set buyers "may save some money" by waiting up to six months until manufacturers convert to the CBS color video process.

Stanton spoke over his own network in defense of Columbia's system, which has been attacked for various reasons by a large part of the industry.

Despite opposition, however, it recently won the approval of the Federal Communications Commission in a split decision.

What effect, Stanton's advice would have on the TV set market —already nervous after the FCC ruling—remained to be seen.

Stanton revealed some of the contention that is sweeping the industry by disclosing that CBS has been barred from a special meeting called for today by the Radio - Television Manufacturers' Association to discuss color TV.

The CBS system has been strongly opposed by the Radio Corporation of America—which is working on a method of its own—and by a majority of set makers.

"If any statements come out of that meeting, I hope you will read them in the light of these facts," Stanton said to the public.

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The color programs were scheduled by the Federal Communications Commission to begin Nov. 20, but may be delayed by lawsuits protesting the ruling.

David Sarnoff, board chairman of RCA — owner of Columbia's powerful rival, NBC — called the FCC decision "an absurdity."

POST-DISPATCH
ST. LOUIS, MO.
Oct. 16, 1950

Head of CBS Advises Waiting Six Months to Buy Television Set

Prospective Buyers 'May Save Some Money by Giving Manufacturers Time to Convert to Color, He Says.

NEW YORK, Oct 16 (AP) — Frank Stanton, president of the Columbia Broadcasting System, said last night that television set buyers "may save some money" by waiting up to six months until manufacturers convert to the CBS color process.

Stanton spoke over his own network in defense of Columbia's system, which has been attacked for various reasons by a large part of the industry. The CBS color system recently won the approval of the Federal Communications Commission in a split decision.

Stanton revealed that CBS has been barred from a special meeting called for today by the Radio-Television Manufacturers' Association to discuss color TV.

An association spokesman said Stanton's request to have a CBS representative present was turned down because it was a closed meeting, and CBS was not a member of the association and not a television manufacturer.

The CBS system has been strongly opposed by the Radio Corporation of America — which is working on a method of its own—and by a majority of set makers.

"If any statements come out of that meeting, I hope you will read them in the light of these facts," Stanton said to the public.

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The color programs were scheduled by the Federal Communications commission to begin Nov. 20 but may be delayed by lawsuits protesting against the ruling.

PIONEER PRESS
ST. PAUL, MINN.
Oct. 16, 1950

CBS Chief Denies Color To Shelve Present TV Soon

NEW YORK—(AP)—Television sets made to receive programs in black and white won't be useless immediately after color broadcasting begins next month, Frank Stanton, president of the Columbia Broadcasting system, said Sunday night.

Owners of America's present 7 million sets will be receiving programs for some time to come, Stanton said in a nationwide (CBS) broadcast.



Stanton

The Federal Communications commission authorized CBS to begin color broadcasts Nov. 20 in a split decision that is being opposed by the National Broadcasting company and other firms interested in developing their own color methods.

Pilot Radio Corp., a set manufacturer, threatened "injunctive proceedings" against the FCC and Brig. Gen. David Sarnoff, board chairman for Radio Corporation of America, called the decision an "absurdity."

"Despite the fact that some manufacturers are seeking to create the impression that the public's investment in television sets is about to be wiped out, nothing could be further from the truth," Stanton said.

The number of color programs will "increase at an orderly rate as the number of sets capable of receiving them increases," Stanton said.

He declared that popular black and white programs will continue until a large percentage of sets is capable of receiving color.

Most of the present set owners, he said, will be able to receive CBS color programs in black and white by purchasing "adapters."

'CONVERSION POSSIBLE'

He said many more sets now equipped to receive only black and white programs can be "converted" to receive color.

Around this issue of "adapters" the whole battle over color television is being waged.

Opponents of CBS have maintained that its color television process was "incompatible" because adapters were required to receive color pictures in black and white.

RCA has maintained that its method, turned down by the FCC, is compatible in that present sets could receive color programs in black and white with no additional equipment.

'MOST SETS 'ADAPTABLE'

"Most sets now on the market can be adapted," Stanton said, "so that when there is color broadcasting, the program will be received in black and white.

"Of course the same sets," he said, "can be converted to receive color broadcasts in color.

"Therefore, if the manufacturers give you their word that there will soon be available adapters and converters for the particular black and white sets which you are considering, you will have protection against obsolescence," Stanton said.

"On the other hand," the CBS president went on, "it will be somewhat cheaper and more satisfactory to buy a black and white set which is already adapted, so that it has built in compatibility. Furthermore, a new combination color and black and white set may be somewhat less expensive and will be more satisfactory than an ordinary black and white set adapted and converted for color.

"Therefore if you wait for say six months, you may save some money, and you will have a self-contained set with built-in compatibility and built-in color."

PUBLIC OPINION
CHAMBERSBURG, PA.
Oct. 17, 1950

CBS PRESIDENT ADVISES TV PURCHASERS TO WAIT

Says They May Save Money by Waiting Six Months

NEW YORK, Oct 16 (AP) — Frank Stanton, president of the Columbia Broadcasting System, said that television set buyers "may save money" by waiting up to six months until manufacturers convert to the CBS color video process.

Stanton spoke over his own network in defense of Columbia's system, which has been attacked for various reasons by a large part of the industry.

Despite opposition, however, it recently won the approval of the Federal Communications Commission in a split decision.

What effect Stanton's advice would have on the TV set market —already nervous after the FCC ruling — remained to be seen.

The CBS system has been strongly opposed by the Radio Corporation of America — which is working on a method of its own — and by a majority of set makers.

JOURNAL
LEWISTON, ME.
Oct. 16, 1950

CBS President Advises Video Buyers to Wait

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Stanton revealed some of the contention that is sweeping the industry by disclosing that CBS has been barred from a special meeting called for today by the radio-television manufacturers association to discuss color TV.

The CBS system has been strongly opposed by the Radio Corporation of America—which is working on a method of its own—and by a majority of set makers.

"If any statements come out of that meeting, I hope you will read them in the light of these facts," Stanton said to the public.

"We do not want the future of television to fall into the hands of any self-appointed group, meeting in secret behind closed doors. We intend to do everything we can to prevent any one from blocking color television and keeping it from the American public."

Stanton said the 7,000,000 black and white sets now in use will not become obsolete as soon as color TV starts.

He said most present sets can either be "converted" to full color use, or "adapted" to receive color programs in black and white.

AMERICAN
WATERBURY, CONN.
Oct. 16, 1950

CBS Head Urges Delay In TV Buying

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David Sarnoff, board chairman of RCA—owner of Columbia's powerful rival, NBC—called the FCC decision "an absurdity."

LEADER-REPUBLICAN
GLOVERSVILLE, N. Y.
Oct. 16, 1950

Stanton Advises 6-Month Wait For Color Video

CBC Chief Believes Conversion Will Take That Long

NEW YORK—(AP)—Frank Stanton, president of the Columbia Broadcasting System, said last night that television set buyers "may save money" by waiting up to six months until manufacturers convert to the CBS color video process.

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Nervous Market

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Secret Meeting

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636

NEWS
PATERSON, N. J.
Oct. 18, 1950

Pilot Radio Files Suit Attacking Color Television

NEW YORK, Oct. 18 (AP)—The Pilot Radio Corp. filed a suit attacking the color television decision of the Federal Communications Commission as arbitrary, capricious and against the public interest.

The suit, first of several that had been promised, asked United States District Court at Brooklyn for an injunction suspending enforcement of the Commission's order of Oct. 12 authorizing the color method of the Columbia Broadcasting System.

Enforcement of the decision, said Pilot, "would impose upon the public useless and unnecessary expenditures for external and internal adapters and like expenditures by the public for converters."

The color decision, the complaint continued, has resulted in cancellations of orders by dealers with Pilot and even larger cancellations by consumers of orders previously placed with dealers.

"Plaintiff and its dealers," the suit continued, "find themselves burdened with a large stock of black and white sets which have been rendered unsaleable as a result of the decision. It said the condition will become progressively worse unless the color decision is suspended.

The Pilot suit contained criticisms of CBS color previously expressed by a majority of manufacturers in statements following the decision that because of its incompatibility it can not be received on present sets even in black and white unless they are specially adapted, and that at the present stage of development the size of CBS color pictures is limited to 12 1-2 inches by the motor-driven color disc in
driven color disc used in front of the picture tube. CBS contends the development of tri-color direct view tubes will make it possible to dispense with the color wheel and to produce pictures as large as those of black and white sets.

The Radio - Television Manufacturers Association, meanwhile, delayed the issuance of a statement drafted at a meeting of its television committee here yesterday. The association has announced the statement would be issued this morning but later said the time of release was indefinite.

Other suits against the FCC were expected momentarily, including one by Radio Corp. of America which was the principal competitor of CBS in the color television hearings.

TIMES
LOUISVILLE, KY.
Oct. 17, 1950

TV Set Manufacturer Sues To Bar C.B.S. Color Order

New York, Oct. 17 (AP)—The Pilot Radio Corp. filed a suit today attacking the color television decision of the Federal Communications Commission as arbitrary, capricious and against the public interest.

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The suit, first of several threatened, asked United States District Court at Brooklyn for an injunction suspending enforcement of the commission's order last Thursday authorizing the color method of the Columbia Broadcasting System.

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The color decision, the complaint continued, has resulted in cancellations of orders by dealers with pilot and even larger cancellations by consumers of orders previously placed with dealers.

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The Pilot suit contained criticisms of C.B.S. color previously expressed by a majority of manufacturers in statements following the decision:

That because of its incompatibility it can not be received on present sets even in black and white unless they are specially adapted, and that at the present stage of development the size of C.B.S. color pictures is limited to 12½ inches by the motor-driven color disk used in front of the picture tube.

C.B.S. contends the development of tricolor direct view tubes will make it possible to dispense with the color wheel and to produce pictures as large as those of black and white sets.

The Radio-Television Manufacturers Association, meanwhile delayed the issuance of a statement drafted at a meeting of its television committee here yesterday.

Other suits against the F.C.C expected momentarily include one by Radio Corporation of America which was the principal competitor of C.B.S. in the color television hearings.

(At Chicago the Hallicrafters Company, maker of receivers said its own poll of 107 television stations shows they "are no more anxious to have an incompatible color system pushed down their throats than are the manufacturers.")

RETAILING DAILY
NEW YORK, N. Y.
Oct. 16, 1950

FCC Stand Seen Upsetting Entire Industry

Misleading Information of Nearness of Color TV Held Certain to Slow Down Buying of Black-White Sets

Radio manufacturers and dealer and distributor associations continued their outpouring of criticism of the Federal Communications Commission at the weekend, following FCC approval of the Columbia Broadcasting System's color television system.

The FCC decision on color TV will upset the entire industry and work against the public interest, the National Association of Electrical Distributors told its members. The association's radio, television, and tubes committee called the FCC decision "impractical," noting that the CBS system is "incompatible" with present receivers and will force "millions of people who have no desire for color now to pay for a questionable gadget of temporary usage."

Misleading information that color TV is a few weeks away "is certain to slow down the buying of black and white receivers almost immediately, with the result that millions of dollars of inventory will be jeopardized," said Ira Lavin, acting managing director of the National Appliance and Radio Dealers Association.

"The FCC is due for much criticism on the utter disregard for the consequences of a premature decision without even giving consideration to the public and to that segment of the industry closest to the public — the retailers," continued Mr. Lavin.

"The public must be told that color TV is still a year and possibly 18 months away from even popular acceptance at marketing levels," he added, and said that NARDA "has charged itself with the responsibility of arming all TV retailers with the proper information for transmission to consumers."

"There is no timetable on inventiveness," said John W. Craig, vice-president and general manager of the Crosley Division, Avco Manufacturing Corp., Cincinnati, indicating that he felt the FCC decision could not be taken as final.

Mr. Craig stated that he felt, and he believes the industry as a whole feels, that the nod has been given to the wrong system. He said, "CBS will be telecasting some 20 hours of color television weekly with no one to receive it."

Joshua Sieger, vice-president of engineering for Freed-Eisemann Radio Corp., New York, claimed that the mechanical sequential color system approved by the FCC was tested and rejected many years ago in British laboratories as unsuited for home use. Since that time, he said, the system has been investigated by hundreds of independent television engineers and research organizations but given up because of its basic limitations.

No video manufacturers are willing to invest in the "manufacture of color receivers based on this antiquated system," said Mr. Sieger. "They will be obsolete before they reach the blueprint stage . . . When color television comes, it will come with the electronic TV tube."

Louis I. Pokrass, chairman of the board of Tele King Corp., New York, said, "Component supply is so critical that it is not possible to deliver television sets which include bracket standards in time to meet the FCC timetable, regardless of engineering time involved."

He stressed the fact that the CBS color picture is limited to 12½ inches and the trend today is toward larger screens.

Michael Kaplan, president of Sightmaster Corp., New York, and head of the Television Manufacturers Association, wired Wayne Coy, FCC chairman:

"Your decision favoring the CBS color system was received with deep concern by TMA. In the public interest, we would like to know whether CBS shares 1/100th of the confidence in their incompatible system that the commission does."

In a telegram to about 25,000 Admiral dealers, Ross Siruss, president of the firm, urged that they inform customers that the FCC decision allows for continuation of dual standards of telecasting, "which means that present excellent programming will continue in black and white on all major networks.

"The impractical, unsightly whirling disc system which the commission approved will be pushed only by CBS, which owns four TV stations out of a nation total of 107. No sponsors will make any investment in color telecasts for an audience which will consist mainly of CBS executives."

John S. Meck of Meck Industries, Chicago, said his firm will not switch to production of color television sets and warned that the CBS system might mean putting a 4½ foot disc, whirling at the rate of 50 miles per hour, into the TV family's living room. This size disc, he explained, would be necessary to produce color pictures from a 21-inch black and white tube size, which will be the most popular size next spring.

638

JOURNAL
MILWAUKEE, WIS.
Oct. 17, 1950

Color TV Rule Taken to Court

Pilot Corp. Files Suit

New York, N. Y.—(AP)—The Pilot Radio Corp. filed a suit Tuesday attacking the color television decision of the federal communications commission as arbitrary, capricious and against the public interest.

The suit, first of several that had been promised, asked the United States district court at Brooklyn for an injunction suspending enforcement of the commission's order of Oct. 12 authorizing the color method of the Columbia Broadcasting System.

Enforcement of the decision, said Pilot, "would impose upon the public useless and unnecessary expenditures for external and internal adapters and like expenditures by the public for converters."

The color decision, the complaint continued, has resulted in cancellations of orders by dealers with Pilot and even larger cancellations by consumers of orders previously placed with dealers.

Claims Sets Unsalable

"Plaintiff and its dealers," the suit continued, "find themselves burdened with a large stock of black and white sets which have been rendered unsalable" as a result of the decision. It said the condition would become progressively worse unless the color decision was suspended.

The Pilot suit contained criticisms of CBS color previously expressed by a majority of manufacturers in statements following the decision: That because of its incompatibility it cannot be received on present sets even in black and white unless they are specially adapted, and that at the present stage of development the size of CBS color pictures is limited to 12½ inches by the motor driven color disk used in front of the picture tube.

CBS contends the development of tricolor direct view tubes will make it possible to dispense with the color wheel and to produce pictures as large as those of black and white sets.

Other Suits Expected

Other suits against the FCC were expected momentarily, including one by Radio Corporation of America, which was the principal competitor of CBS in the color television hearings.

Meanwhile the [redacted] Manufacturers' association asked Frank Stanton, CBS president, for equal time on the CBS radio network to reply to his talk last Sunday night on color television.

Stanton in his talk advised prospective set buyers to purchase only from manufacturers who promised to make equipment that would enable those sets either to be adapted to receive CBS color in black and white or converted to receive in color. And, he added, they "might save some money" and have a self-contained set by waiting six months or so.

Philco Corp. Monday joined the list of television manufacturers opposing the FCC decision to go ahead with CBS color TV. William Balderston, president of Philco, said color television definitely "has not arrived."

Balderston went further. He said: "Color television with bigger pictures than CBS's 12½ inch screen model, finer quality and performance, is being perfected in the laboratories of the industry today.

"It is our firm conviction that this is what will eventually reach the market and we believe further that such a color system is at least two years away."

WORLD-TELEGRAM & THE SUN
NEW YORK, N. Y.
Oct. 17, 1950

TV Fans Lift Hue and Cry Over Color

Does It Work? Most Wonder

By HUGH CONWAY,
Staff Writer.

Television fans from the Bronx to Brighton Beach differed today in their shades of opinion over color TV, but all joined in one big cry over the hue gadget—how well does it work?

They were afraid the cumbersome color wheel that looks like a delicatessen bologna slicer might prove just that. They indicated a shyness about showing the green of their cash till they could see the true blue hue on a video tube. Many thought the estimated cost—$70 to $100 or more—too high just to tell the color shorts on their favorite wrestler.

A Brooklyn writer—two-set man (one a portable)—proposed that the Columbia Broadcasting System shoulder part of the cost.

'It's Up to CBS.'

"CBS stands to gain the most ultimately through a bigger audience," said Charles Richman of the Hotel St. George. "Let them set up a non-profit service department that, for a nominal fee, would insure and service your TV set for a year, if you bought a converter from a private manufacturer. It's up to CBS to take an active part, if it wants to put this thing across. This might be a solution to the trouble many people have had with service firms."

Mrs. Harry Robbins, a housewife, of 771 West End Ave., wanted to know how much the necessary converters would cost.

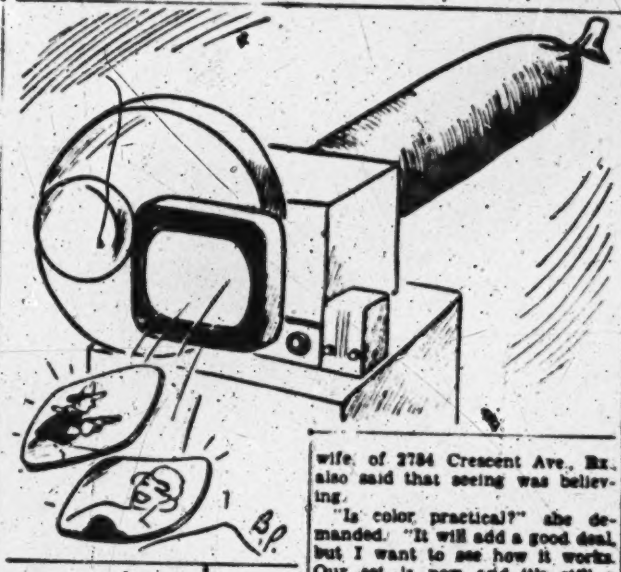
"This is the most important thing," she said. "The prices they are talking about seem expensive. For the present, I'm not interested."

Mrs. Agnes O'Brien, a housewife, of 142 W. 87th St., owner of a 19-inch set, wondered about the number of color broadcasts.

"When are they going to do enough to make it worth while?" she asked. "Besides, before I'd buy a converter, I want to see how well it works."

Shows Wariness.

Alfred Bamberger, a perfume atomizer manufacturer, of 144-35 Northern Blvd., Flushing, was enthusiastic but wary.



"I think it's a tremendous thing, but I don't want to be disappointed," he said. "I don't want to experiment, either. I'll buy one immediately, but they've got to prove it works, and works well."

Mrs. Fred W. Read, a housewife, of 2784 Crescent Ave., Bx., also said that seeing was believing.

"Is color practical?" she demanded. "It will add a good deal, but I want to see how it works. Our set is new and it's still a novelty. We're happy with it the way it is."

Culinary Angle.

Norman Chanois, a law student, of 114 Brighton 11th St., Bklyn., thought the average set owner was taking a beating on the converter system proposed by CBS.

"Many are in the relatively low income brackets," he said. "They've already invested a lot of money. To buy a converter may mean scrimping for weeks for something that may be obsolete next year."

Mr. Chanois said his own set had something better to offer than color.

"You can also make toast on it because the tube gets so hot," he announced.

Concerned With Sins.

Mrs. Edward Baunach, a housewife, of 112-02 Park Lane South, Richmond Hills, said the price of the converters seemed fair.

"It's not much when you put up $60 a year just for insurance," she said. "I think it would be fun to have color TV, but a 12½-inch picture is going to seem awful small on our 16-inch screen."

Leo A. Sher, a banquet manager, of 1402 57th St., Bklyn., was not stumped by the color problem. He canceled an order for a new set today.

"I can wait a couple of months," he said. "Maybe they'll have sets then that will make the present ones as antiquated as the old headset radio. Why try to dress up an old set with a converter? It may soon be like trying to dress up a prewar car to look like a 1950 model."

640

CHICAGO DAILY NEWS
CHICAGO, ILLINOIS
Oct. 18, 1950

WHO'S WRONG

Color TV Battle Total Confusion

BY JACK MABLEY

The mighty battle of words over color TV which was predicted, not very exclusively, in this paper six days ago, is flooding the country.

Undoubtedly you still are quite confused by the whole color situation. Don't be alarmed. That means you understand the thing perfectly. It is complete confusion. If it made sense to you, it would indicate you don't know all the facts.

• • •

IN JUDGING CBS color, you must consider the source of the opposition. Television is a terrifically competitive industry, and yet never have the manufacturers been so solidly united in one cause.

They could hardly be more vehement in their denunciation of the CBS color and the FCC decision in favor of it. And they are the men who made television the giant industry it is today.

It would be difficult, if not foolhardy, to ignore the warnings of these men.

• • •

DAVID SARNOFF, head of RCA, called the FCC decision "an absurdity." Ross D. Siragusa, president of Admiral Corp., said CBS color "will bumble along to an audience of CBS executives."

William Balderston, president of Philco Corp., said color TV has not arrived, and that a new system still in the laboratories is at least two years away from perfection.

Comdr. E. F. McDonald Jr., president of Zenith Corp., and Paul Galvin, head of Motorola, strongly oppose the CBS system. William J. Halligan, president of Hallicrafters Co., called the decision "craven, brought about by misguided senatorial pressures."

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JOHN MECK, head of Scott Radio Laboratories, criticized the decision. John Craig, vice-president of Crosley, said color TV in the home still is three to five years away.

Can all these men be wrong? Can they have been right in the last two decades in building one of America's greatest new industries at the fastest rate in history, and then suddenly be unanimously wrong about color TV?

POST HOME NEWS
NEW YORK, N.Y.
Oct.15, 1950

Color TV Tangle Cuts Into Sales

Television was having a severe case of growing pains Saturday, complicated by outraged manufacturers and a confused public.

The cause of the chaotic condition which rocked the infant industry was the recent Federal Communications Commission ruling authorizing the Columbia Broadcasting System to go ahead with its color transmission method.

As retail store spokesmen reported a drastic drop in sales, CBS and its opponents prepared for a series of legal battles which promise to shape up into one of the most bitter courtroom contests in American industry.

The system approved by the FCC would require the modification of the 8,000,000 sets now in use by the addition of an adapter to receive color programs in black and white and a rotary converter to receive them in color.

Both the Radio Corp. of America and the Pilot Radio Corp. announced that they were preparing legal action to enjoin the FCC ruling.

990

THE NEW YORK TIMES
NEW YORK, N.Y.
Oct. 18, 1950
From the Editorial Page

TELEVISION CHAOS

The Federal Communications Commission has decided that television images in color must be transmitted by what is technically known as a "non-compatible system," meaning a system that will make it impossible for some eight million owners of television sets to receive even black-and-white from a color-transmitting station without paying about $400,000,000 for auxiliaries. Hence the consternation and dismay with which the decision has been received. Few voices have been raised in the Commission's defense. In arriving at its decision the Commission ignored the findings of a committee of scientific experts, headed by Dr. E. U. Condon, Director of the National Bureau of Standards, and appointed by the chairman of the Senate Committee on Interstate and Foreign Commerce to make an impartial study of the status of color television.

The section of the Communications Act under which the Commission promulgated its decree directs it "to encourage the larger and more effective use of radio in the public interest." This broad language may justify the setting of long-term transmission standards to insure fidelity of reproduction in color or black-and-white, brightness of image and high quality in general.

But the Commission has not contented itself with setting standards. In effect it is dictating to manufacturers what kind of television sets they are to make if images are to be received in color with converters and in black-and-white with adapters. The Commission admits that the black-and-white images into which color is to be translated by installed sets at great expense will be of inferior quality. Yet the Commission is supposed to safeguard the public interest.

The testimony taken in committee hearings at the time the Communications Act became a law leaves it to be inferred that Congress had no intention of authorizing the Commission to invade the factory. It is true that the Commission's order applies only to television transmitting stations. It so happens that there is a lock-and-key relationship between a television station and a television receiving set. Hence any decision that affects television stations also affects manufacturers of home sets.

This coercion of an industry which has hitherto enjoyed a large measure of freedom is apparently without precedent. In the case of color television we have a usurpation of authority that needs correction. That correction may now be made, for the Communications Act is now coming up in the federal courts for interpretation. The time for the judicial interpretation of the phrase "to encourage the larger and more effective use of radio in the public interest" has arrived.

642

TIMES
NEW YORK, N. Y.
Oct. 20, 1950

F.C.C. Decision on Television

Adoption of Color Standards at This Time Held in Public Interest

To the Editor of The New York Times:

The confusion and misunderstanding about the Federal Communications Commission decision concerning color television has engulfed even THE NEW YORK TIMES editorial page. The editorial of Oct. 18 is appropriately entitled "Television Chaos," but the chaos inheres not in the Commission decision but in your interpretation thereof.

The first error in the editorial is the statement that the Commission "ignored the findings of a committee of scientific experts headed by Dr. E. U. Condon, director of the National Bureau of Standards * * *." This is a charge already made by R. C. A. and nobody else. It is wrong.

The Condon committee and the Commission were functioning in different spheres and with different responsibilities. The Condon committee made no recommendations concerning choice of systems; further, the areas of agreement between the Commission findings and the report of the Condon committee are far greater than the areas of disagreement.

The editorial's basic criticism of the Commission's decision is that the Commission went beyond its functions in not only setting standards but in "dictating to manufacturers what kind of television sets they are to make if images are to be received in color with converters and in black and white with adapters." It is charged, therefore, that the decision constitutes "coercion of an industry" and "usurpation of authority."

These criticisms are based on a complete misunderstanding of the Communications Act, of the function of the Commission and of the effect of the Commission's decision.

Type of Signal

Before radio or television can be broadcast on a regular commercial basis it is necessary that the Commission first set technical engineering standards prescribing the type of signal which must be transmitted. Unless there are such standards it would be possible for each station to send out a different type of signal and the consumer would have to have a different receiver for each station.

Setting standards for broadcast service has always been the procedure followed. It is precisely what the Commission did when it authorized black-and-white television. Once it set black-and-white television standards, any manufacturer who wanted to go into the business of making and selling television receivers obviously had to make receivers designed to receive the signal being transmitted if he wished to offer a usable product.

The editorial itself recognizes this "lock-and-key relationship between a television station and a television receiving set." But having recognized this basic relationship, the editorial then ignored it and thus has been led into its basic error.

Of course, each manufacturer remains free to make precisely the kind of television set he chooses. He can continue to make ordinary black-and-white sets if he thinks he can sell them. He can make any one of a variety of types of sets which will receive color, just as a number of manufacturers are engaged in producing different models to receive the C. B. S. system.

In setting standards for color the Commission has done exactly what it has always done in authorizing any radio or television broadcast service. In this decision, therefore, it has usurped no functions and dictated to no one unless what it has always done constitutes usurpation and dictation. Never before has it been suggested that when the Commission in the past has set standards it has been guilty of "dictation" or "usurpation." It cannot be so suggested because the setting of standards is one of the explicit and necessary functions of the Commission.

Compatibility Problem

Further, it is to be noted that it clearly was in the public interest for the Commission to adopt color standards now, instead of delaying the question further. The Commission concluded, on the basis of ten years' experimentation with color, that there is no reasonable probability that a satisfactory "compatible" color system (that is, a color system capable of being received in black and white on existing receivers without change) can be developed. It found that only the C. B. S. system is now capable of producing satisfactory color, and only the C. B. S. system assured such color for the foreseeable future.

Since the C. B. S. system is "incompatible"—and thus requires changes in existing sets to receive the color signals in black and white—the public interest compelled a prompt decision in order to prevent further aggravation of the compatibility problem. The degree of increased aggravation of the compatibility problem can be measured on the basis of the 8,000,000 sets now in the hands of the public as against perhaps as many as 40,000,000 black-and-white sets in the foreseeable future.

To have postponed the decision would have imposed great additional economic burdens on the public, or deprived it of color altogether unless a satisfactory compatible system should some day be developed—a contingency the Commission did not find likely.

In the light of these basic facts which the editorial overlooked, the criticisms therein were plainly mistaken.

FRANK STANTON,
President, Columbia Broadcasting System, Inc.

New York, Oct. 18, 1950.

[Mr. Stanton overlooked the fact that we expressly conceded the right of the Commission to set standards, but questioned its right to set up systems of transmission.

That the F. C. C. ignored the Condon report was brought out on Sept. 10 at the Institute of Radio Engineers' convention in Los Angeles. A question from the floor addressed to a member of the F. C. C. brought the reply: "The Senator Johnson-Condon report was not entered as hearing material and therefore was not given consideration in the F. C. C. decision." The report was issued on July 10—time enough for its consideration.

Mr. Stanton's statement that the "areas of agreement" between the Condon committee and the F. C. C. "are far greater than the areas of disagreement" is not borne out by the Condon report. On Page 40 appears a table in which the system that Mr. Stanton advocated scores only eight points. Of two other systems one scored eleven points and the other six. It looks as if there were more areas of disagreement than of agreement.

Mr. Stanton says that "each manufacturer remains free to make precisely the kind of television set that he chooses." The manufacturer who does not produce a set that will conform with Mr. Stanton's system courts bankruptcy within five years or so.

How does Mr. Stanton know that the odds are against the development of a "compatible" color system? The Condon committee arrived at different conclusions on Pages 37 and 38 of its report.

Mr. Stanton thinks that in the public interest the F. C. C. had to arrive at a prompt decision. The Commission has been considering television for ten years. The Condon committee was appointed because the vacillation and dilatoriness of the F. C. C. forced the Senate to seek the best technical advice that competent technologists could

Editor, THE TIMES.]

CHICAGO DAILY NEWS
CHICAGO, ILL.
Oct. 18, 1950

TV Stations Hold Off On Plans for Color

BY PHIL S. HANNA

Getting down to cases William J. Halligan, president Hallicrafters, sent a wire to 107 operating TV stations asking "the date at which you plan to commence color television."

Forty-five stations out of 54 replying said they have no plans whatever for using Columbia Broadcasting color.

The importance of this is better understood when it is recalled that the Federal Communications Commission last week formally selected the CBS system as the one the stations and manufacturers must use.



W. J. HALLIGAN

The television industry is apparently up in arms over what it considers to be hasty action of the commission.

Forty five of the stations replying gave estimates of the time when color telecasts could begin. The estimates ranged from two to 10 years.

• • •

SIX of the 45 stations expressed concern for the black and white set owners in their areas. For example one said:

"We are in favor of color but we have been urging that it be on a compatible, agreeable basis. We have no immediate plans to go to color. It seems our first obligation is to the 160,000 people in our area who have bought black and white receivers. . . ."

• • •

WCPO of Cincinnati replied, "How could we telecast color and who would receive it if we could."

KDYL of Salt Lake City replied:

"Have no plans whatever for colored telecasting plus no equipment for color.

"No public clamor hereabouts for TV color. Everyone seems happy with black and white. Color premature and impractical."

• • •

SIX of those replying said they had no plans for color and would not use CBS color unless forced to do so.

Two Columbia Broadcasting stations said they would not only be reluctant to carry the CBS color telecast if and when such programs were fed over their network but had no time available.

Of the remaining replies, two said they would broadcast CBS color when the network supplied such programs.

• • •

ONE STATION said it would carry CBS color but only if there were enough local receivers in the area to receive it.

Another station said "experimental" color broadcasts might begin in 1951.

Five stations refused to comment.

Paul H. Eckstien, Hallicrafter TV sales manager, declared the answers clearly indicate the station people are no more anxious to have an incompatible color system than the manufacturers.

644

WORLD-TELEGRAM &
THE SUN
NEW YORK, N. Y.
Oct. 17, 1950

Pilot Radio Sues to Halt Color Video

Injunction Would Bar Nov. 20 Start

TV fans' reaction to color—turn to First Page, Second Section.

A leading television set manufacturer today aimed a haymaker at the Columbia Broadcasting System's color wheel.

The Pilot Radio Corp. applied in Federal Court, Brooklyn, for an injunction to suspend the Federal Communication Commission's approval of the CBS method of tinting the TV screen.

The FCC has told CBS it can begin commercial use of its system Nov. 20. Bt the fact that color broadcasts will be just blanks on present receivers without use of adapters and converters has brought a chromatic howl from the setmakers.

Effect on Market.

Pilot, a 31-year-old Long Island City firm, had many uncomplimentary things to say about the FCC ruling in a 12-page complaint. But one of its chief concerns was the effect on the current TV market since color got the green light.

Dealers are canceling orders with Pilot and consumers are staying out of dealers' shops in droves, the complaint said. Both the company and dealers, it added, find themselves burdened with large stocks of unsaleable black-and-white sets. And Pilot said it expects the situation to get progressively worse.

Not Enough Time.

The company charged the FCC acted "expressly" on "hope and speculation and the ephemeral belief that further experimentation . . . would justify the commission's decision." It maintained further that the government agency had recognized there are "significant developments" in color TV which could render the CBS system "archiac." But, it said, the FCC has refused to permit enough time for study of the improvements. CBS has 30 days to answer the suit.

STAR-JOURNAL
LONG ISLAND CITY, N.Y.
Oct. 18, 1950

L. I. City Firm Sues to Void TV Color Edict

AN INJUNCTION seeking to restrain the Federal Communications Commission from enforcing its color television decision of last week was sought yesterday in Brooklyn Federal Court by the Pilot Radio Corporation of Long Island City.

A similar suit was filed by the Radio Corporation of America in Chicago.

Pilot harshly criticized the FCC ruling that established the Columbia Broadcasting System's color television as the standard for the industry.

The 31-year-old Long Island City radio firm, 37-06 36th street, noted that dealers are cancelling orders with Pilot and consumers are not buying sets, leaving dealers with large unsaleable stocks of black and-white sets. The latter will not pick up color telecasts without adapters and converters.

* * *

THE COMPANY charged that the FCC didn't permit enough time for study of color improvement and pointed out that there are "significant developments" in color TV which could render the CBS system "archaic."

The FCC ruling was described as "arbitrary, capricious and against the public interest."

Pilot maintained that enforcement of the decision "would impose upon the public useless and unnecessary expenditures for external and internal adapters and like expenditures by the public for converters."

Other companies stressed that an electronic system of color TV, compatible with black-and-white sets, would be developed in the "near future."

BEACON-NEWS
AURORA, ILL.
Oct. 22,1950

SEE NOTHING BUT RED IN COLOR VIDEO

BY C. E. BUTTERFIELD
(AP Radio TV Reporter)

Irrespective of the merits of either side, about all any of the participants in the color television row have been able to see so far is red.

The question has become the industry's hottest fight.

Right in the middle is the Federal Communications Commission, which in view of its final approval of the CBS system and subsequent court action by RCA and others, has been put into the position of defending one side of a highly controversial matter.

Also involved is the question of prestige in the development of color. Then there is the effect all this is having on the public.

Crux of the fight has centered on whether the F.C.C. erred in approving the older semi-mechanical CBS system, with standards different from black and white, in preference to newer wholly electronic compatible methods.

The public is showing its reaction by increased signs of a tendency to wait until things settle down.

The controversy even has spread to the air. Last Sunday Dr. Frank Stanton, president of CBS, spoke over his network on behalf of CBS color. Tonight at 4:45 o'clock also CBS, a 15-minute requested period has been assigned to Robert C. Sprague, president of Radio-Television Manufacturers association, to reply.

TIMES
NEW YORK, N. Y.
Oct. 19, 1950

TV RULING IMPERILS LESSER SET MAKER

Another Fears Shutdown If Confusion Persists in Outlook for Color

The possibility that one of the smaller television manufacturers may be forced to stop production of receivers was one of a series of developments yesterday resulting from the Federal Communications Commission's order approving the Columbia Broadcasting System's color telecast method.

Michael L. Kaplan, president of the Sightmaster Corporation, said "we are not going into further television production for the time being. Mr. Kaplan said his plant's current orders for sets would be filled in about thirty days, at which time production would be halted.

Another small manufacturer, the Video Corporation of America, also hinted it was worried over the future. Michael M. Platsman, its president, said that "if the present confusion were to continue, some manufacturers, including ourselves, may have to close down."

The Television Manufacturers Association—not to be confused with the larger group that makes both radio and television sets—said it probably would join in one of the injunctive proceedings already filed against the Federal Communications Commission. The commission has authorized C. B. S. to start commercial color programs on Nov. 20.

Adrian Murphy, a vice president of C. B. S., reassured a meeting of Retail Radio-Television and Appliance Dealers that the growth of color television would cover a period of many years, and that black-and-white transmissions would be made for a long time.

In their special meeting, the dealers decided to defer any possible court action against the F. C. C., but voted to ask the commission for an "unequivocal statement" that existing black-and-white standards were not obsolete.

The F. C. C. was quick to deny a charge by the Radio Corporation of America that the Commission, in approving C. B. S. color, had relied on the advice of one of its engineers who had invented a device usable only with the C. B. S. system. The charge was made in R. C. A.'s suit filed in United States District Court in Chicago on Tuesday.

The F. C. C. said it had announced publicly last January the development in its own laboratories of a device that fitted in with the C. B. S. system. The Associated Press reported. The January announcement said that Edwin W. Chapin and Willmar K. Roberts, chief and assistant chief, respectively, of the laboratory division, had invented an automatic adapter whereby existing sets could tune in both black-and-white and C. B. S. color broadcasts.

The F. C. C. said its original announcement had emphasized that the invention had been assigned to the United States Government.

The F. C. C. also ordered the National Broadcasting Company to cease its practice of broadcasting R. C. A. color television programs during regular transmitting periods, although it may continue at other hours.

646

RETAILING DAILY
NEW YORK, N. Y.
Oct. 19, 1950

Western N. Y. Distributors Attack FCC Color TV Ruling

Call Decision "Hasty, Misguided, Dictatorial" — Urge Letters to Congressmen and Commission Members

BUFFALO, Oct. 18.—Western New York television distributors attacked the Federal Communications Commission's approval of the Columbia Broadcasting System's color television method.

Some called the FCC action a "hasty, misguided or a dictator's ruling." At least two distributors urged present television-set owners to protest the ruling in letters to their Congressmen or to the FCC.

Distributors' comments on the FCC color-television ruling included:

Richard Levy, vice-president of W. Bergman Co. Inc., Philco distributor—"I'm afraid its like NRA and other misguided legislation which have been declared unconstitutional. We believe that three television-set manufacturers will get an injunction and take it to a high court. The commission appears to have over-extended itself. The agency never before presumed to tell manufacturers what they could or could not do."

Ben Kulick, president of Fayman Distributors Inc., Admiral distributor—"It is a dictatorial ruling. Television-set owners should contact their Congressmen or Senators to compel the FCC to let manufacturers develop color television in an orderly manner without jeopardizing the present investment by over 7 million set owners today. Color television is coming, but it has to be developed in evolutionary steps.

Manufacturers are running into shortages of component parts now for the production of black-and-white receivers. How can they change their production lines for a new product when they can't get enough materials for what they are producing now?"

Lee A. Wells, vice-president of Western Merchandise Distributors, Inc., Crosley distributor—"I think the FCC has made a hasty decision. The timing is wrong. I don't think the FCC should have rushed the ruling through until color television has been investigated from all angles, with the public's interest uppermost in the plans. We should take color television in our stride. A penny postal card from present television-set owners to the Congressmen or the FCC might be helpful in delaying the action."

Irving A. Nadritch, vice-president of Bickford Bros. Inc., Motorola distributor—"I still think color television is three to five years away despite the decision by the FCC. I don't think a single television-receiver manufacturer could produce 100 sets within the next six months for receiving color television. Our transmitting facilities are not ready for color television yet."

RETAILING DAILY
NEW YORK, N. Y.
Oct. 20, 1950

FCC Not to Advise Public On Purchases of TV Sets

WASHINGTON, Oct. 19.—The Federal Communications Commission, which adopted the Columbia Broadcasting System, Inc., color television system for commercial use starting Nov. 20, will not advise the public whether to buy existing sets or wait for color receivers, it was made clear today.

In a poll made by the Washington Daily News, six of the seven commissioners went on record as not having any responsibility for advising the public what to do about buying sets. Commissioner Edward M. Webster was out of town and was not polled.

Wayne Coy, FCC chairman, said he would not answer the question of whether he would advise the public to buy sets now or wait for color, while Robert F. Jones explained he will tell them to make up their own minds.

Miss Frieda B. Hennock noted that she was against the decision and did not want to get into the controversy. If the public demands color it will get it, she said, adding that she did not know what to say.

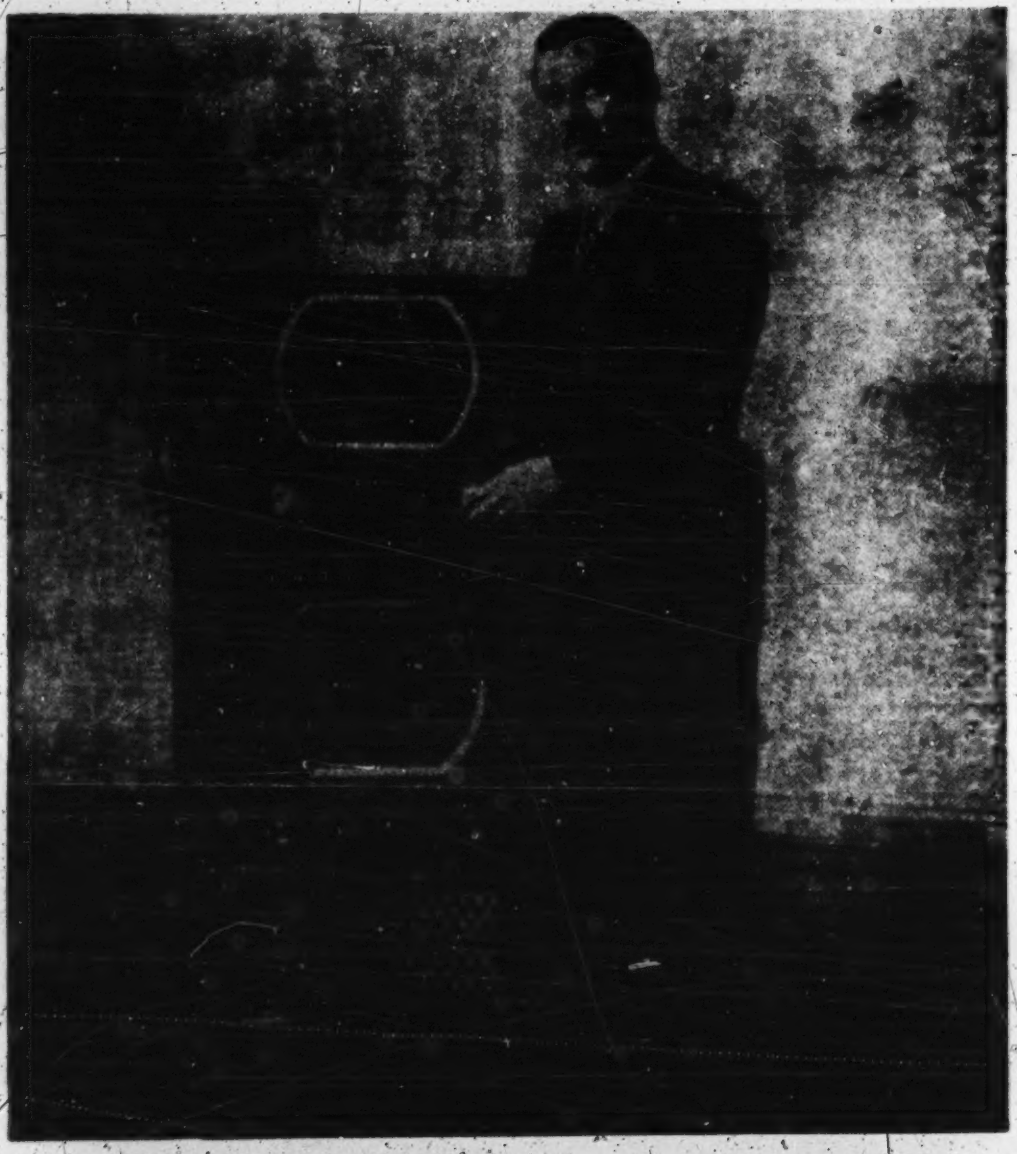
Rosel Hyde noted that FCC had not ordered anyone to broadcast color and said the only answer he had was that he would ask for TV service on the basis of the decision or get a dealer to agree to provide that service in the future. TV service, under the color decision, will consist of standard black and white, plus monochrome and color under the CBS system.

Paul A. Walker felt that the commissioners should not be drawn into the matter, but said if a friend asked him for advice "I'd tell him but I wouldn't make a pronouncement about it." What he would tell the friend was not stated, but Mr. Walker pointed out that FCC had given the public the opportunity to do what it wanted about buying sets.

George E. Sterling, who opposed the decision, along with Miss Hennock, said he would not want to advise the public, but he would have no hesitancy in telling a friend to go out and buy a set. He could convert it later, he will get substantial returns from black and white programming now, and it will take CBS considerable time to develop color programs in terms of choice broadcasting hours, Mr. Sterling said.

648

RETAILING DAILY
NEW YORK, N. Y.
Oct. 20, 1950



Sol W. Gross, president of Tele-tone Radio Corp., New York, unveils [illegible] self-contained color television converter this week. Called the "Tele-Color" unit, the device is said to enable present and future black and white sets to receive color broadcasts and can be used in conjunction with either table or console models. The unit is expected to be marketed Jan. 1., although no price has been set as yet.

JOURNAL-GAZETTE
FORT WAYNE, IND.
Oct. 22,1950

All Confusion With Color TV

NEW YORK, (AP) — The color television controversy flashed and thundered last week in the biggest storm in the 30-year history of broadcasting.

With a two-billion-dollar stake in sets already bought and billions more in possible cost differences in future sets, the public is bewildered at this latest battle of the giants, Columbia Broadcasting System and Radio Corporation of America.

With the set owner in the middle, the lineup on the opposing sides is something like this:

On one side: CBS, the FCC which approved its system, and Sen. Edwin C. Johnson (D-Colo.), chairman of the Interstate Commerce Committee of the Senate which passes on FCC appointments and appropriations.

On the other side: RCA, and Pilot Radio Corp., both of which have filed court suits attacking the FCC decision, plus a great majority of other manufacturers.

In the middle along with the public are operators of the 107 television stations now on the air. They face the problem of whether to start colorcasts knowing their audiences would be very limited to begin with. (CBS owns and operates one station, WCBS-TV in New York, and has 49 per cent interest each in WTOP-TV in Washington and KTTV in Los Angeles).

System Incompatible

The CBS system is incompatible colorcasts under the system could be received only on sets that had been specially adapted or converted to its standards. Stations and sponsors would have to decide whether the cost of colorcasts would be warranted by the size of the audiences.

During the week the FCC ordered the National Broadcasting Co., RCA subsidiary, to discontinue broadcasts using RCA color during regular programs of stations WNBW in Washington and WNBT in New York, and confine them to times outside regular program schedules. The network also was ordered to use different call letters for the colorcasts.

NBC had been sending part of the WNBW programs with an occasional relay to WNBT — in color as a reminder to set owners that RCA's own color system was compatible—and not only would be received in color on color sets, but also would appear in black and white on present sets, with no alteration or adaptation of the sets whatever. The FCC in approving CBS color rejected the systems proposed by RCA and Color Television, Inc., and refused to delay its decision to permit demonstrations of systems proposed by General Electric and others.

File Suit

Earlier in the week, a suit attacking the decision was filed in Federal District Court in Chicago by RCA, joined by NBC and RCA Victor Distributing Corp. and, a similar suit was filed in New York by Pilot Radio Corp., maker of radio sets since 1919 and a television pioneer. Both charged the decision by favoring an incompatible system would cause hardships on present set owners by requiring them to buy extra equipment that would not be necessary under a compatible system.

Some dealers reported success in convincing prospective set buyers who come into their stores that black and white television will remain the backbone of video service for years to come, and that they can safely go ahead and buy a current type set.

"That's all very well," said one major dealer, "if you can get them into the store, but they've stopped coming in to look."

Entirely aside from the color controversy, there are the new credit restrictions of 25 per cent and 15 months, the 10 per cent excise tax starting November 1, and the higher income tax deductions which on a $75 a week man's salary just about equals the payments he'd make on a television set. Things may be rosy for color television but it looks like a dark Christmas for us.

650

JOURNAL
MILWAUKEE, WIS.
Oct. 22, 1950

Dispute Over Color TV Bewildering Set Buyers

Battle Between Mighty CBS and RCA Also Hurts Dealers as Purchases Show Drop

By WAYNE OLIVER

New York, N. Y. (AP)—The color television controversy flashed and thundered last week in the biggest storm in the 30 year history of broadcasting.

With a two billion dollar stake in sets already bought and billions more in possible cost differences in future sets, the public is bewildered at this latest battle of the giants—Columbia Broadcasting System and Radio Corporation of America.

And the nation's television dealers, thrown into a turmoil themselves and with large stocks of sets on hand, sought to soothe the public on the situation created by federal communications commission approval of CBS color.

Eleven days after the decision, the flurry of the controversy is still mounting instead of subsiding, and color television still seems to be in the indefinite future for the majority of the public—regardless of the outcome of the controversy and accompanying lawsuits.

How Sides Line Up

With the set owner in the middle, the line-up on the opposing sides is something like this:

On one side: CBS, the FCC which approved its system, and Senator Johnson (Dem., Col.), chairman of the interstate commerce committee of the senate, which passes on FCC appointments and appropriations.

On the other side: RCA and Pilot Radio Corp., both of which have filed court suits attacking the FCC decision, plus a great majority of other manufacturers.

Only three smaller manufacturers, plus several equipment makers, have announced plans to make equipment for receiving CBS color. Senator Johnson has charged that most manufacturers are on a sit-down strike against CBS color. Most set makers have contended that there will be insufficient public demand for CBS color equipment, with its motor driven disk, to warrant its manufacture.

In the middle along with the public are operators of the 107 television stations now on the air. They face the problem of whether to start colorcasts knowing their audiences would be very limited to begin with.

[CBS owns and operates one station, WCBS-TV in New York, and has 49% interest each in WTOP-TV in Washington and KTTV in Los Angeles.]

Told to Discontinue

Since the CBS system is incompatible, colorcasts under the system could be received only on sets that had been specially adapted or converted to its standards. Stations and sponsors would have to decide whether the cost of colorcasts would be warranted by the size of the audiences.

During the week the FCC ordered the National Broadcasting Co., RCA subsidiary, to discontinue broadcasts using RCA color during regular programs of stations WNBW in Washington and WNBT in New York, and confine them to times outside regular program schedules. The network also was ordered to use different call letters for the colorcasts.

NBC had been sending part of the WNBW programs—with an occasional relay to WNBT—in color as a reminder to set owners that RCA's own color system was compatible and not only would be received in color on color sets, but also would appear in black and white on present sets, with no alteration or adaptation of the sets whatever. The FCC in approving CBS color rejected the systems proposed by RCA and Colu Television, Inc., and refused to delay its decision to permit demonstrations of systems proposed by General Electric and others.

Suit Filed in Chicago

Earlier in the week, a suit attacking the decision was filed in federal district court in Chicago by RCA, joined by NBC and RCA Victor Distributing Corp., and a similar suit was filed by Pilot Radio Corp., maker of radio sets since 1919 and a television pioneer. Both charged the decision by favoring an incompatible system would cause handships on present set owners by requiring them to buy extra equipment that would not be necessary under a compatible system.

The RCA suit charged further that the FCC's decision was influenced by advice of a staff engineer who "invented" a device usable in the CBS system.

The FCC hotly retorted that it was not influenced by the advice of the engineer, who it identified as Edwin W. Chapin, FCC laboratory chief. It said the device developed by Chapin and Wilmar K. Roberts, an assistant, had been assigned to the government and Chapin did not stand to profit from it.

Vigorous Opposition

The commission also said it would vigorously oppose the injunction suits by RCA and Pilot, and asked the court in Chicago to transfer the suit there to New York city, where RCA has its headquarters. And Pilot announced it would intervene in the RCA suit and withdraw its own separate suit since both involved the same issues.

Dealers were perturbed by large stocks of black and white sets ordered in anticipation of a continuation of the television boom and a buying rush to beat the new 10% excise tax that goes into effect Nov. 1.

Some dealers reported success in convincing prospective set buyers who come into their stores that black and white television will remain the backbone of video service for years to come, and that they can safely go ahead and buy a current type set.

"That's all very well," said one major dealer, "if you can get them into the store—but they've stopped coming in to look."

"Instead of 15 to 20 sets a day, I've been selling one or two," said another. "I'm convinced the public will resume buying once it becomes clear that black and white television will continue as the principal television service, and color will be supplementary and optional but it's rough right now."

1000

COURIER-JOURNAL
LOUISVILLE, KY.
Oct. 22, 1950

Color-TV War Thunders on Before Bewildered Public

Dealers Report Black-White Sets' Sales Plunging

By WAYNE OLIVER
Associated Press Staff Writer

New York, Oct. 21.—The color-television controversy flashed and thundered this week in the biggest storm in the 30-year history of broadcasting.

With a $2,000,000,000 stake in sets already bought and billions more in possible cost differences in future sets, the public is bewildered at the latest battle of the giants—Columbia Broadcasting System and Radio Corporation of America.

Television dealers, thrown into a turmoil themselves and with large stocks of sets on hand, sought to soothe the public on the situation created by Federal Communications Commission approval of C.B.S. color.

Fury Is Mounting

Ten days after the decision, the fury still is mounting instead of subsiding, and color television still seems to be in the indefinite future for the majority of the public—regardless of the outcome of the controversy and accompanying lawsuits.

With the set owner in the middle, the line-up is something like this:

On one side: C.B.S., the F.C.C. which approved its system, and Senator Johnson (D., Col.), chairman of the Interstate Commerce Committee, which passes on F.C.C. appointments and appropriations.

On the other side: R.C.A. and Pilot Radio Corporation, both of which have filed suits attacking the F.C.C. decision, plus a great majority of other manufacturers.

Senator Johnson has charged that most manufacturers are on a sitdown strike against C.B.S. color. Most set makers have contended there will be insufficient public demand for C.B.S. color equipment, with its motor-driven disc, to warrant its manufacture.

In the middle along with the public are operators of the 107 television stations now on the air. They face the problem of whether to start colorcasts knowing their first audiences would be very limited.

Colorcasts under the C.B.S. system could be received only on sets that had been specially adapted or converted to its standards. Stations and sponsors would have to decide whether the cost of colorcasts would be warranted by the size of the audiences.

F.C.C. Curbs Colorcasts

During the week the F.C.C. ordered the National Broadcasting Company, R.C.A. subsidiary, to discontinue broadcasts using R.C.A. color during regular programs of stations WNBW in Washington and WNBT in New York, and to confine them to times outside regular program schedules. The network also was ordered to use different call letters for the colorcasts.

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The F.C.C. in approving C.B.S. color rejected the systems proposed by R.C.A. and Color Television, Inc., and refused to delay its decision to permit demonstrations of systems proposed by General Electric and others.

Suits Charge Hardship

Earlier in the week, a suit attacking the decision was filed in Federal District Court in Chicago by R.C.A., and a similar suit was filed in New York by Pilot Radio Corporation, a television pioneer. Both charged the decision would cause hardships on present set owners.

The R.C.A. suit charged further that the F.C.C.'s decision was influenced by advice of a staff engineer who "invented" a device usable in the C.B.S. system.

The F.C.C. hotly retorted that it was not influenced by the advice of the engineer, whom it identified as Edwin W. Chapin, F.C.C. laboratory chief. It said the device developed by Chapin and Willmar K. Roberts, an assistant, had been assigned to the Government and Chapin did not stand to profit from it.

Dealers were perturbed by large stocks of black-and-white sets ordered in an anticipation of a continuation of the television boom and a buying rush to beat the new 10 per cent excise tax that goes into effect November 1.

'Dark Christmas' Feared

Some dealers reported success in convincing prospective set buyers that black-and-white television will remain for years to come, and that they safely can go ahead and buy a current-type set.

"That's all very well," said one major dealer, "if you can get them into the store—but they've stopped coming in to look."

"Instead of 15 to 20 sets a day, I've been selling one or two," said another. "I'm convinced the public will resume buying once it becomes clear that black-and-white television will continue as the principal television service, and color will be supplementary and optional—but it's rough right now.

"Entirely aside from the color controversy, there are the new credit restrictions of 25 per cent and 15 months, the 10 per cent excise tax starting November 1, and the higher income-tax deductions which on a $75-a-week man's salary just about equals the payments he'd make on a television set. Things may be rosy for color television, but it looks like a dark Christmas for us."

652

CHICAGO DAILY TRIBUNE
CHICAGO, ILLINOIS
Oct. 23, 1950
From the Editorial Page

POLITICAL TELEVISION

The federal communications commission has given the Columbia Broadcasting system a license to broadcast commercial television programs in color, and as a result the air is full of technical and economic arguments and threats of lawsuits.

There are several sponsors of color television systems, but only two approaches to the problem. One system, Columbia's, is partly mechanical. It uses a whirling disk to put color on the screen. The other approach, in which Radio Corporation of America [which owns the NBC chain] has made the most progress, is wholly electronic.

The Columbia system is the farther advanced in laboratory development at present, tho it has had little field testing. Many of its demonstrations have been on closed wire circuits—not broadcasting. RCA is believed to have made great progress in recent months. Its remaining problems are of the sort that good electronic scientists should be able to solve, engineers tell us. Another electronic color system is being developed by Color Television, Inc., a California concern.

The great difference, to the present set owner, is that RCA color television, if and when it is perfected, can be received in black and white on existing sets, tho not in color. Columbia color television requires adapters, of which one has been designed to bring in the programs in black and white, and an additional one to bring in color.

Within recent weeks Wayne Coy, chairman of the FCC, came out to a convention of television manufacturers in Chicago and told them that if they would agree to begin installing in their new sets, almost immediately, a "bracket standard," color television would be kept on an experimental basis for a while longer. If they refused, Columbia was to be given an immediate commercial license, he threatened.

A "bracket standard" is not, as we innocently inquired of an engineer, some bit of hardware inside a television cabinet, designed to provide space for a color adapter. It is a virtually complete second receiver for color. This is somewhat as if the government required automobile manufacturers to equip all cars with carburetors and motors capable of burning fuel oil as well as gasoline.

The manufacturers, after Coy refused a 60 day delay which they asked for the purpose of figuring costs, turned his proposal down. They felt they would be buying a pig in a poke.

Since the war, Columbia and RCA, thru their phonograph subsidiaries, have engaged in another technological battle. Each brought out a long playing record, but the speed of the turntables was different. There was no FCC to "protect the consumer" in the record field. [Its so-called protection would cost present television set owners half to three-quarters of a billion dollars, at Columbia's own estimates.] Eventually manufacturers brought out turntables that would handle both types of long playing records as well as the old standard records. The public, not a government bureau, was the umpire in that dispute.

The intervention of the FCC in the color television field, at its present stage of development, makes no more sense than government intervention in the photograf turntable fight would have done. The public eventually will have to decide the television dispute, also, by its patronage, and the rival systems could well have been left to fight it out for this public acceptance.

The members of the commission who had an engineering background voted a g a i n s t the order. The case smells of a New Deal fix. Unless Columbia can find an audience for its programs, however, it seems unlikely to stick.

1002

CHICAGO DAILY TRIBUNE
CHICAGO, ILLINOIS
Oct. 3, 1950

FCC VIDEO ORDER TO HURT BUYERS, COMPANY SAYS

[Chicago Tribune Press Service]

Washington, Oct. 2—The Zenith Radio corporation of Chicago told the federal communications commission today the commission's recent color television decision might force future buyers of TV sets to pay 200 million dollars a year for an additional gadget which may never be needed or used.

Zenith and other television manufacturers filed comments with the FCC regarding its request that they start producing television sets to receive both regular black and white pictures and the Columbia Broadcasting system's color pictures in black and white.

Can't Meet Time Limit

The FCC has tentatively chosen the CBS color television for commercial use. The commission asked manufacturers to change the design of their sets to include the dual tuning switch this fall. In general, Zenith and the others advised the FCC its time limit for the change-over could not be met—that it would be well into next year before the new type receivers could be turned out.

Zenith said the dual tuning switch probably could be included in new sets by next May 1, but that it would add $30 to $40 to the retail price of each set. The company asserted:

"This is a severe penalty for the public to pay. The switch may never be needed. At the present rate of sales, the cost to the public might be as much as 200 million dollars a year for a feature which may never be used."

At Work on Gadget

Similarly, the Sentinel Radio corporation of Evanston, Ill., advised the FCC it was willing to make the change, but warned that it would require eight to 10 months and add $35 to $50 to the cost of each set. The Stewart-Warner corporation of Chicago reported it was working on the new dual reception gadget, but could not complete the job in the time suggested by the FCC. The Magnavox company of Fort Wayne, Ind., said the FCC proposal "involves a complete redesign of present receivers" which could not be done this year.

TIMES
NEW YORK, N.Y.
Oct.22,1950

VIDEO SET SALES DECLINE AT STORES

Some Retailers Cancel Orders As Inventories Pile Up—Promotion Increased

By WILLIAM M. FREEMAN

Sales of television receivers have dropped sharply at retail stores in this area, a check of distributors showed yesterday.

The sudden falling-off of demand, which is ascribed to the approval of a method of transmitting color television and to government restrictions on credit purchases, has left many stores with heavy inventories.

Some dealers have canceled orders, it was reported, and there is a strong tendency to be selective in ordering. The bigger manufacturers were said not to be especially concerned over this development, as the backlog of orders is high and is believed to be sufficient to keep factories going at or near capacity for some time. Smaller producers are not in as good a position and were described as worried.

Promotion Is Increased

Promotion efforts have been increased in the last few days as distributors attempted to keep store traffic flowing and to counter the tendency to wait until color sets or receivers built to take converters are put on the market.

A selling appeal getting an important play is the suggestion that persons contemplating a purchase of a set act before the new Federal excise tax goes into effect on Nov. 1.

At a meeting last week, Adrian Murphy, vice president of the Columbia Broadcasting System, whose color system received approval of the Federal Communications Commission, told members of the Industrial Relations Committee of the Retail Television and Appliance Dealers Association that present black-and-white sets were not obsolete.

He asserted that they could be equipped with a converter to receive the C. B. S. color programs when they are put on the air. The programs are scheduled to start next month and be on the air about twenty hours a week.

F. C. C. Assurance Sought

Following the meeting the association decided to ask the F. C. C. and the major manufacturers to assure the public that present sets would not be outmoded. It was believed that such statements would check the downward trend of sales of black-and-white sets.

Six of the seven commissioners of the F. C. C. said, however, in answer to questioning by a Washington newspaper, that they felt it was not their responsibility to advise the public on what to do with regard to purchasing a set. The seventh commissioner was not available.

One of the chief objections to the C. B. S. system voiced by its opponents is that the purchase of a converter would be necessary. They concede that present sets can receive the color telecasts by the addition of a suitable device, but point out that such a system would mean losing that part of the audience which did not possess converters.

Therefore, they say, the system approved should be one which can receive color or standard telecasts without additional investment. The stumbling block here is that such a set, called "compatible," designed to receive all telecasts, would tend to outmode present sets.

Advertising interests say that sponsors probably will continue to invest in black-and-white programs until sales figures for color sets or converters make a shift to color worth while.

RADIO & TELEVISION WEEKLY
NEW YORK, N. Y.
Oct. 25, 1950

VIDEO RECEIVER SALE IS OFF IN MILWAUKEE; FCC DECISION BLAMED

Store Owners Are Busy Explaining That Despite Action, Color Broadcasts Are Still Remote.

By JEROME GREENBLATT

MILWAUKEE, WIS., Monday — Sales of television receivers fell off sharply in the Milwaukee area following the announcement by the Federal Communications Commission that it had definitely approved the CBS system of color television. Clerks were kept busy explaining to customers, or recent buyers of sets, that color television for the Milwaukee area was still remote.

One manager stated: "After we explained the situation, most of them apparently were satisfied. Things will slowly return to normal, once the scare is ended."

Another department store reported that customers stayed away in droves because of the decision of the FCC. A great many purchasers of sets wanted to return them in view of the FCC's action, but after a thorough explanation, everyone was satisfied after the facts were pointed out to them.

One of the large chain retailers of appliances and television sets says the television department, normally one of the busiest in the store, was practically empty.

One dealer had a very witty comeback when he replied: "I have color-vision right now — Blonde, Mahogany and Walnut. And that is likely to be all the color television the public will see for a long time."

The big question in this area today is: "What will color television mean to owners of black-and-white sets? Distributors and dealers were amazed by the FCC decision. Everyone felt that the logical color system would be by electronics and not mechanical.

The League of Wisconsin Radio Stations, at a meeting Wednesday at the Plankington Hotel, changed its name to the Wisconsin Broadcasters' Association. The group re-elected Ben Laird of WDUZ, Greenville, as president.

Other officers also elected are: Joseph Mackin, of WNAM, Marinette, vice president; Ken Schmitt, of WIBA, Madison, secretary; Mrs. Jeanne Heal, of WTCH, Shawano, treasurer; George Frechette, of WFHR, Wisconsin Rapids; Bruce Wallace, of WTMJ, Milwaukee, and Howard Dahl, of WKBH, La Crosse, directors. Mr. Wallace is manager of public service broadcasts and promotion for the Milwaukee Journal station.

The public in this area is beginning to realize that there is a shortage of tubes, this is, of the receiving type and for TV. The Taylor Electric Co., distributor of RCA products, said they were 125,000 tubes behind in orders.

The Broadway House of Music, 764 North Broadway, a distributor of Du Mont and Capehart sets, stated that some sets had come through with some tubes missing, but that recent shipments had all the tubes.

Distributors and jobbers have established a policy of their own regarding the sale of tubes in some instances. In order to secure a new tube, the old one of similar type must be turned in. This is being done in order to prevent hoarding.

The Acme Radio Supply Corp., 510 West State street, reported that next month's tube allotments include only two tubes of a type upon which sales average 100 a month. This situation is causing servicemen to use their ingenuity in substituting other numbers in place of those in the sets.

The Electrical League of Milwaukee will, on November 3, honor three members who are celebrating their fiftieth anniversaries in the electrical industry, all with the electric company. The men are Fred Benz, Nels Christopherson and Al Meisenheimer. The affair will be at the Astor Hotel.

RETAILING DAILY
NEW YORK, N. Y.
Oct. 25, 1950

November Video Sales Outlook For New York Stores Seen Dim

Some Outlets Show Declines Up to 50% in Week and Half—New Credit Terms, Color Controversy Heavy Factors

By B. H. HELLMAN

November is likely to be the worst month for TV business since the beginning of the year, New York retailers forecast gloomily yesterday.

Reason for the prediction, according to stores spot-checked yesterday, is that (1) sales have already declined sharply since the Federal Communications Commission's decision on color TV, (2) the expected buying rush before the imposition of the 10 per cent excise tax on Nov. 1 has simply not materialized, and (3) the combination of the excise tax plus the 25 per cent down payment is expected to knock out a substantial portion of prospective sales.

Some consumers are buying now in order to avoid paying the new levy, department store buyers and independent merchants said, but not enough to keep sales at the high levels of the past three months. Some outlets reported declines as high as 40 to 50 per cent in the past week and a half, although others asserted that the drop had been more moderate.

Cite Factors.

In some quarters, the doldrums were attributed almost entirely to the color controversy, but promotional houses, which specialize in credit sales, were of the opinion that the new time-payment regulations were also a weighty factor in the loss of business.

Whatever the causes of the present slackening of business, the present deterrents to sales are expected to increase with the imposition of the excise tax next Wednesday. A minority, however, feels that there may be a pickup in the last two weeks of November, on the grounds that customers who have been knocked out of the present market are saving their money in order to buy sets before Christmas.

Others, however, are of the opinion that the damage won't be repaired that quickly. Ready cash, they point out, has very little to do with the fact that a considerable segment of the public seems to have decided not to buy sets because of the color controversy.

Stocks Heavier.

Meanwhile, inventories are heavier than they have been in months and have been piling up with increasing rapidity in the past two weeks as supplies loosened up. The shaky financial position of small dealers, who depend on quick turnover in order to pay their bills, is expected to bring a wave of clearances very soon if their inventory load grows any bigger.

Already discounting to the public has increased. Stores that sold at list or gave only 10 per cent up to recently are now going as high as 20. In the past week there were also hints that several large TV dealers would break at any moment with big clearance sales.

Buying Pattern Shift.

Two changes in the pattern of buying have been observed in the past week. First, stores have noticed an astonishing rise in the proportion of cash sales. This is attributed to the fact that customers who have the money now would rather pay in full than bother with the new credit terms, which no longer offer the advantages of "easy" payment.

Secondly, a greater and greater proportion of sets being sold are in the low-priced category. The reason for this, according to merchants, is that many people are still willing to gamble on an inexpensive set becoming obsolete, but won't risk investing in a high-priced model.

1005

656

RETAILING DAILY
NEW YORK, N. Y.
Oct. 25, 1950

Color Confusion, Credit Curbs Bring Drop in Chicago TV Sales

Most Report 5-10% Drop Under Previous Week and Some Have Trouble Meeting 1949 Figures

By EDWIN G. WEBER

CHICAGO, Oct. 24.—The confusion over color and the more stringent credit regulations combined to bring about a further decline in television sales in the Chicago area during the past week.

Nearly all stores checked report sales 5 to 10 per cent under the week before, and a number of dealers commented that for the first time in months, they are now having trouble meeting their sales figures of a year ago at the same period.

Sharpest declines are noted by the downtown department and specialty stores. Outlying stores, both chain and independent, and particularly the stores which emphasize industrial and discount sales, have been affected somewhat less, though some of the smaller stores are beginning to be hurt by unbalanced inventories.

The combination of unfavorable factors has more than offset the expected stimulus from the coming excise tax. The impending tax has been extensively advertised, and while some stores are still hopeful it will show some results as Nov. 1 approaches, results to date are said to be a disappointment.

Plenty of Promotion

Failure to cash in on the tax cannot be blamed on lack of promotion as factory and dealer co-op advertising has been running at the highest level in the history of the industry in this area. Several of the larger users of advertising space said they have no intention of curtailing their advertising budgets and at least two said they are planning special last-minute promotions to break just before the tax becomes effective.

Opinion is divided among local retailers as to whether the color controversy of the 25 per cent down payment requirement has had the greater adverse effect on sales. Effect of the stricter credit terms can be measured more immediately, since nearly all stores have seen customers walk out when told that the $80 which they thought would be sufficient for the down payment on a $400 set would have to be upped to $100.

Others point out that we will never know how many good prospects have been kept away from the stores by the color uncertainty, and point to the much higher ratio of sales to traffic in the last 10 days as evidence that only those who have definitely decided to buy are now being drawn into the stores.

The dealers agree that color and higher terms have resulted in the sale of more lower priced units than formerly and many look for this trend to become more pronounced when the tax goes into effect.

No Cancellation Problem

Local distributors report that cancellations have not been serious enough to constitute a problem, despite the declining retail sales, and the major line distributors, at least, say they have no trouble re-allocating the few ~~sets~~ [illegible] cancellation. It was noted, however, that for the first time since early summer, some of the name-brand wholesalers now have sets for immediate delivery, even in the more popular models.

Several distributors said they have discontinued shipping against orders without verifying the order in each case, and they make no secret of the fact that they are beginning to watch the credit of some of their accounts much more closely than during the past several months.

Biggest bugaboo worrying the local trade, at both retail and distributor levels, is what will happen after Nov. 1. Many suspect that this fall's price increases have been an element in the failure of business to reach the expected volume, particularly since the down payment was boosted, and that another hike in the customer's outlay, as a result of the tax will bring a further sharp decline in sales.

For some of the smaller stores, especially those which over-extended themselves in anticipation of shortages and to beat the tax, such a drop might be disastrous and result in forced liquidations which would upset the entire industry.

RETAILING DAILY
NEW YORK, N. Y.
Oct. 27, 1950

Philadelphia, Kansas City Dealers Hit Godfrey Talk

PHILADELPHIA, Oct. 26.—Although there was no concerted action, television dealers here vigorously protested to Lipton Tea Co. regarding Arthur Godfrey's admonition to televiewers Monday night that they delay purchasing a set for six months because of the imminence of color.

Many dealers sent telegrams and letters to both Lipton and Mr. Godfrey. Others, although not taking such action, termed the action "very poor judgment" and asserted that they planned to influence friends and relatives to take some retaliatory action.

Among those writing letters to the sponsor was Sam Pasmon, secretary-treasurer of Pasmon's, Inc., Market street store. He declared the firm "should be more interested in selling tea than television . . . and for all the money you're paying Mr. Godfrey for his own and station time you should be concerned with obtaining more viewers instead of trying to discourage them."

A protest also was registered by Mort Farr, Upper Darby, Pa., dealer and director of the National Appliance and Radio Dealers' Association. "It's difficult to understand Mr. Godfrey's reasoning," he commented. "For a man who owes everything to circulation—which means the sets we sell—his remarks just don't add up.

"The big danger to dealers lies in the fact that we won't get a chance to talk to all those people who might have heard him on the AM broadcasts. If we could get them into our stores, we could explain our side of it," Mr. Farr declared.

Response Prompt.

KANSAS CITY, Mo., Oct. 26.—A hot rash of reaction to Arthur Godfrey's advice against immediate television buying, on his TV program last Monday night has broken out in the electric industry here.

Prompt response from the Kansas City Electric Association came through a telegram last night to the president of Lipton Tea Co., sponsors of the program, signed by Yale Witschner, Westinghouse Electric Co. and president of the local association. The telegram read as follows:

"The trade association of the entire electrical industry in the Kansas City trade area feels deeply Lipton Tea's sponsorship of Godfrey's comments on Talent Scout program of Monday, Oct. 23, was most ill-advised and Godfrey's advice to our potential customers was entirely out of order.

"A manufacturer of one product should not advise the public against buying an item produced by a completely different industry.

"We trust a clarification of your position in this matter as sponsor of Godfrey will be forthcoming on your next program."

The association also has written air mail to members of the International Association of Electric Leagues informing them of the telegram, and suggesting similar action. "We may be able to establish the point that no one should tell our customers they should not buy the products we have for sale," the letter read in part. It was signed by R. J. Samson, executive manager of the association.

Electric appliance dealers and television distributors of the local organization also have been informed of the action of the group.

Spot reactions of some dealers indicated considerable indignation at the presumption of a performer to suggest consumer actions outside his proper field.

CHICAGO TRIBUNE
CHICAGO, ILLINOIS
Oct. 29, 1950

WAIT ON COLOR? YOU MAY WAIT LONG, LONG TIME

Better Buy Now or You Will Miss a Lot

BY LARRY WOLTERS

About all the combatants in the color television controversy have been able to see so far is red. The recent decision of the federal communications commission, approving the CBS color system, has generated just about the hottest fight in the radio-TV industry's history. Arrayed against CBS and the FCC are most of the big TV manufacturers who have said that they do not intend to go into the CBS semi-mechanical type of color set production.

The Radio Corporation of America and Philco have gone to court seeking to halt the order approving CBS color. The crux of the fight centers on whether the FCC erred in approving the older mechanical system, with standards different from black and white, in preference to the newer wholly electronic compatible system, one of which has been developed by RCA.

[The CBS color system requires adapters before it can be seen even in black and white on present sets, and an expensive attachment so that present sets can pick up colorcasts.]

Profit and Prestige

RCA was charged that the FCC exceeded its authority in demands made on manufacturers; also that it was influenced in its decision by an engineer who had contributed an invention used in the CBS system. At stake, of course, are tremendous profits and great prestige.

The general attitude of the big manufacturers to the FCC ruling was, pretty [illegible] "crazy decision" dictated by misguided senatorial pressure.

Thereupon, Sen. Johnson [D., Colo.], chairman of the senate commerce committee, charged that the set manufacturers were engaging in a "sit-down strike" against the government-approved color TV. In a lengthy statement he strongly upheld the FCC and its ruling and included therein this charge: "Always there has been resistance to new things by selfish interests."

Engineer Votes No

Actually most of the competent television engineers regard the CBS system as somewhat outmoded and look upon the all electronic system as the newer. It is significant that one of the two FCC commissioners who voted against the CBS system's adoption was a former FCC chief engineer.

Furthermore, the opposition from set makers is coming from those who have been in the forefront of the development of television, RCA, General Electric, DuMont, Motorola, and Philco among them. David Sarnoff, chairman of the board of RCA, recently said that his company had plowed more than 50 million dollars into the development of television before it got back a cent. Such a company can hardly be described as resistant to new things. Also, it should be remembered that CBS has had no set manufacturing experience.

Set makers directed their criticism mostly against two features of CBS color: The fact that it is incompatible with present standards and cannot be received on present sets even in black and white unless they are adapted, and the limitation of the size of the color picture to 12½ inches at the present stage of development in which a motor driven disc is used to give color to the images.

The Public's Quandary

Some of the smaller companies say they will have adapter-converters on the market by Nov. 20 when the CBS system starts rolling, unless blocked by the courts. How the public will respond to these remains to be seen. They didn't go, in any large numbers, for the FM adapters.

Naturally, these developments have put the set owner in a somewhat of a quandary. However, he can continue to tune in the great variety of present black and white programs. If he wants to spend considerable money and experiment he can buy the gimmicks to bring in color, when color telecasting comes to his city. And except in New York, not much is in promise program-wise in the foreseeable future.

Worth the Price

Most of the TV stations on the air have no plans as yet to carry CBS color. These include the Chicago stations, except WBKB, which might do some colorcasting a few hours during the day.

If still a prospective buyer, he'll have to use his own judgment whether to wait until color transmissions and receivers arrive. Color introduction is going to be slow even without the industry row.

If he doesn't buy a black and white set, meanwhile, he'll miss a lot of fine entertainment. All evidence at hand now indicates that black and white programming will be the dominant medium of telecasting for a long, long time. Regardless of the outcome of the color hullabaloo you'll get your money's worth out of today's black and white receiver. Our advice is: Go ahead and buy a set.

659

RETAILING DAILY
NEW YORK, N. Y.
Oct. 31, 1950

Atlanta Video Sales Decline From 50-75%

ATLANTA, Oct. 30.—Sales o ftelevision receivers have slowed down an estimated 50 to 75 per cent the past 10 days here and retailers blamed it on a combination of the new Regulation W and the confusion created over the FCC color ruling.

It is only within the past few days retailers have begun to feel the pinch of consumer resistance to present models because of the fear of obsolescence, they reported today. The response to the tighter credit terms was felt in a drop in sales immediately, it was pointed out.

However, for the first few days after the color ruling only the "best informed" customers asked questions about color and how it would affect sets now on the market. These were few, it was noted.

Now national publicity through magazines, radio and television have projected the color question into the spotlight to the extent that many prospective customers now are wary of buying.

One dealer reported he had received calls only this week from customers he had sold several weeks back, seeking information on the color question.

Observers generally believed the Federal excise tax to be placed on receivers beginning Nov. 1, would further cut into sales. However, they felt that business would pick up again in about four or five weeks with the coming of colder weather and the indoors recreation season.

THE NEW YORK TIMES
NEW YORK, N.Y.
Nov. 8, 1950

FURNITURE SALES DOWN IN OCTOBER

Home Appliances, Carpets and TV Sets Also Show Loss —Latter at Standstill

Dollar volume of local home furnishings stores for the first five selling days of November ran 20 to 25 per cent behind the corresponding period last year, leading merchants reported yesterday.

James B. McMahon Jr., executive vice president of the Associated Furniture Dealers of New York, reported at the same time that final October compilations indicated a decline of 4.5 per cent as against October, 1949.

Mr. McMahon said that October was the first month in 1950 to drop below a like period of 1949. His figure represents a weighted average of volume done by thirty top local outlets with due weight given to larger stores.

Retailers stressed that the McMahon report gave an accurate analysis of over-all October volume but offered little inkling of the "catastrophic" sales drop in the last two weeks of that month. Poor business, they emphasized, is continuing this month.

Furniture volume in the last three weeks is from 12 to 25 per cent behind the comparable period last year, stores reported. Major appliance sales have dropped from 15 to 50 per cent. Carpet sales are off 20 to 30 per cent.

New Tax Saves TV Sales

Television sales for October ran 2 to 3 per cent behind last year. Merchants said the drop would have been far greater if it were not for the last minute rush to beat the excise tax which went into effect on Nov. 1. The head of one important store said the October decrease would have been "much, much more than 4.5 per cent" if television sales in the last two weeks did not jump as much as 700 per cent over the like period last year.

With the excise tax buying spur no longer a factor, retail television sales are again at a standstill, the store head reported. November sales of other departments continue at the same reduced rate experienced during the last two weeks of October, he said.

The tightening of credit controls in the middle of October was said to be one of the most important factors, if not the most important, in the drop of major appliance sales. The amendment to regulation W calls for a 15 per cent down payment and fifteen months to pay on furniture and floor coverings and 25 per cent down with the same period to pay on appliances and television.

In addition to tighter credit restrictions, television sales still are hampered by the color controversy, one merchant reported. A spokesman for another well-known store said terms have little to do with the serious decline in carpet sales. He asserted that manufacturers simply had priced themselves out of the market.

1009

660

RETAILING DAILY
NEW YORK, N. Y.
Oct. 31, 1950

Indianapolis TV Sales Slump 20-60% Since FCC Decision

Some Retailers Believe New Credit Restrictions Are to Blame but Most Attribute Decrease to Federal Ruling

By C. W. SWIGER

INDIANAPOLIS, Ind., Oct. 30.—Retail television stores uniformly report a sharp drop in both traffic and sales in the last few days, but there is a wide difference in the admitted extent of the slump.

One larger downtown retailer declares a 60 per cent decrease in his business since first announcement of the Federal Communications Commission's recent color decision, and others admit their sales are down from 20 per cent to 40 per cent. On the other hand, some specialty stores and furniture stores in residential areas claim their sales are off "a little," but not to an extent to cause alarm.

Dealers do not by any means agree as to the cause of this loss in sales. Most stores attribute the public's sudden hesitancy to uncertainty engendered by the FCC color decision.

Also Blames FCC Decision.

This attitude is typified by one Northside dealer who points out that his firm for a long time demanded 25 per cent down on television sets, later dropped this to 15 per cent, then raised to 25 per cent again when latest credit regulations went into effect. He does not believe credit restrictions have influenced his customers greatly, yet sales are suddenly down. His conclusion is that confusion and uncertainty engendered by the color situation is responsible for his loss of business.

Generally, midtown dealers have suffered worse than those in outlying areas, and in some of the larger stores it is difficult to determine the extent to which color and new credit regulations are responsible. Some of these stores formerly sold television without a down payment, and the natural assumption is that tightened credit controls may be responsible.

However, among these stores are some which cater to upper income brackets, customers to whom the larger first payment would be unimportant, and the buyers are therefore inclined to blame most of their lost business on the color squabble.

While all dealers admit that traffic has fallen off, now and then a retailer reports that the percentage of sales closed is higher in relation to the number of prospects, which is taken to indicate that there is less "shopping."

WFBM-TV Officials Silent.

Officials of WFBM-TV, Columbia Broadcasting System outlet here and the city's only television station, declined to comment when asked if there was likelihood that their station would undertake to transmit color programs in the near future. The inference was there, however, that WFBM has no immediate plans for a change-over which would be both expensive and require considerable time.

Distributors say the slackening retail business has not yet affected them, but there is some pessimism as they look forward to the excise tax deadline and the additional impact it is almost certain to have on retail sales.

Distributors admit that dealer pressure for goods has lessened, but since most of them are working against a heavy backlog of orders, commitments still are sufficient to take all the merchandise they can get.

Retail Buying Cautious.

Retailers, however, are buying more cautiously, and are placing the bulk of their orders on models which have been most popular, and in lines which have greatest public acceptance. One distributor says he is convinced that within the next few weeks the old trend will be completely reversed, and wholesalers will again have to go out and do a selling job.

In view of all this, retailers have been slugging away with rather heavy advertising programs, emphasizing home demonstrations and urging the public to buy before the excise tax goes on Nov. 1.

NEW YORK WORLD-TELEGRAM
NEW YORK, N.Y.
Nov. 7, 1950
From the Editorial Page

Telling Off the FCC.

After crawling way out on a limb in the colored television controversy, the Federal Communications Commission yelled for help from a source it previously had spurned, the Radio Corporation of America. It wanted that corporation to turn over its tricolor television tubes and circuits to the Columbia Broadcasting engineers for experimental use.

Quite properly and emphatically, Frank M. Folsom, president of RCA, has told the FCC that the suggestion makes just as little sense as expecting the Yankees to turn Joe DiMaggio over to the Phillies at the start of the World Series.

In more serious vein he wrote the FCC that what it was asking was that costly research work done at the expense of RCA stockholders be turned over to another private enterprise. Such a move, he declared, "cannot be regarded as in the public interest or in accordance with well-established American principles of free competition and fair play."

Furthermore, he reminded the bureaucrats that they have only themselves to blame; that their attempt "to force an incompatible color television on the American public has backfired."

The Folsom letter adds up to telling the FCC to go fly a kite which seems the proper answer to any completely cockeyed proposal.

CHGO. SUNDAY TRIBUNE
CHICAGO, ILL.
Sept. 17, 1950

30 PER CENT OF VIDEO FAMILIES WANT 2D SET

Thirty per cent of Chicago families owning television sets are considering buying a second set for their homes, according to a survey made in behalf of John Meck, the Chicago radio and television manufacturer.

Actually 7 per cent of the families polled have made definite plans to buy their second receiver, while 23 per cent more are thinking they would like to have another set. Some 3.6 per cent of the families already own two or more TV sets.

When asked what picture size they would want on the next set purchased, the replies were:

	Pct.
10 inch	1.2
12½ inch	13.3
14 inch	7.1
16 inch	46.1
17 inch	1.0
19 inch	16.2
21 inch	4.1
30 inch	1.3
Projection	.3
No decision	9.3

This compares with the following distribution of sets now owned by these families:

	Pct.
7 inch	4.4
10 inch	38.8
12½ inch	32.4
14 inch	1.6
15 inch	1.1
16 inch	17.6
19 inch	2.7
No answer	1.6

Of those families indicating they did not plan to buy a second set, five said they would wait for a decision on color telecasting. The families queried had owned sets an average of 15.1 months.

In commenting on the findings, Mr. Meck said:

"These findings add an important dimension to the television market. If 30 per cent of set owners can be considered active prospects for a second set, we must raise our sights by at least 30 per cent over original estimates of the saturation that represents the industry's market potential. It also means a larger volume of replacement."

CHGO. DAILY NEWS
CHICAGO, ILL.
Sept. 23, 1950

4 Chicago TV Firms In Top 10

Four Chicago television set manufacturers and one from nearby Plymouth, Ind., are among the top 10 TV manufacturers, in a production forecast of Television Shares Management Co. of Chicago.

The company is an investment adviser and sponsor of Television Electronics Fund Inc.

The company estimates that the output of the top 10 set manufacturers in 1950 will almost double the entire industry production of last year.

• • •

THE ENTIRE industry, comprising some 100 companies, will produce more than 6,500,000 sets this year, compared with 3,100,000 sets in 1949, the company estimates.

The top 10 manufacturers are estimated to rank as follows in 1950:

RCA, 950,000 sets; Philco, 900,000; Admiral, 850,000; Motorola, 650,000; Zenith, 475,000; Emerson, 450,000; General Electric, 425,000; DuMont, 275,000; John Meck, 200,000; and Hallicrafters, 190,000.

• • •

ADMIRAL, Motorola, Zenith and Hallicrafters are Chicago firms. Meck's factory is in Plymouth, Ind. John Meck also is president of Scott Radio Laboratories, Chicago.

Estimates of production made earlier this year have been scaled down slightly because of the parts situation caused by the war.

The company estimates that the demand for sets this year could easily exceed 7,000,000 units.

1012-1013

[fol. 1014] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

AFFIDAVIT OF SAMUEL I. ROSENMAN—Filed Nov. 13, 1950

STATE OF NEW YORK,
County of New York, ss:

Samuel I. Rosenman, being duly sworn, deposes and says:

1. I am an attorney, admitted to practice in the State of New York and before the Supreme Court of the United States. I am, and have been throughout the recent color television proceedings before the Federal Communications Commission, counsel to the Columbia Broadcasting System, Inc. I have participated in said color television proceedings as counsel for CBS, and I am familiar with such proceedings and the Commission's Reports issued subsequent to said proceedings. This affidavit is submitted in opposition to plaintiffs' motion for a temporary restraining order and a temporary or interlocutory injunction, and in support of the motions to dismiss or for summary judgment filed by defendants and by CBS.

[fol. 1015] 2. I have carefully examined and analyzed the 81 pages of affidavits filed by plaintiffs in the above-captioned case. Such examination and analysis indisputably disclose that with the exception of a few pages, the plaintiffs' lengthy affidavits are not directed to the issue of irreparable injury to plaintiffs—the fact necessary to be established as a condition precedent to the issuance of a temporary restraining order or a temporary injunction.

Indeed, the major affidavit of plaintiffs—that of Dr. C. B. Jolliffe—is in almost its entirety unrelated altogether to plaintiffs' injury, immediate or ultimate. On the contrary, it is devoted to an attempt to reopen the color proceedings *de novo* before this Court. It is filled with a great many allegations of "fact" and technical opinions which can properly be addressed only to the FCC, and which during the lengthy proceedings before that agency, *were in fact addressed to it by plaintiff RCA itself.*

It is well established law that upon judicial review of administrative rule-making which is a result of full hearings before an administrative agency, the reviewing court will not and cannot hear the evidence *de novo,* but rather,

will restrict itself to review on the record made before the agency. *National Broadcasting Company* v. *United States*, 319 U. S. 190. Plaintiffs' affidavits, however, represent a flagrant attempt to re-try the issues which they have already [fol. 1016] unsuccessfully tried before the FCC—and allegations embodied in plaintiffs' affidavits relating to the correctness of the FCC's findings and conclusions are already fully answered in those findings and conclusions, and in the evidence *in the record* which support them. The record is the only permissible source of examination.

For the foregoing reasons, and upon my advice on the basis of clear and decisive authority, CBS in its affidavits filed herewith has not undertaken to reply to the misdirected contentions of plaintiffs, except to the insignificant extent that such affidavits relate to the question of immediate and irreparable injury. The CBS affidavits also refer to certain other peripheral matters which are raised by the plaintiffs dehors the record, and concerning which there is no genuine dispute of fact.

The failure of CBS to answer the other portions of plaintiffs' affidavits, accordingly, is not to be deemed a concession that those affidavits are correct. Rather it is because, for the most part, the affidavits embody allegations which are not properly a part of the case in this court.

Samuel I. Rosenman.

Sworn to before me this 10th day of November, 1950. Anthony Gagliano, Notary Public, State of New York, No. 24-1356350, Qualified in Kings County, Certificate filed with N. Y. and Kings County Clerks and Register.

Commission expires March 30, 1951.

[fol. 1017] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

AFFIDAVIT OF FRANK STANTON—Filed Nov. 13, 1950

STATE OF NEW YORK,
County of New York, ss:

Frank Stanton, being duly sworn, deposes and says:

1. I am, and have been since 1946, the President of the Columbia Broadcasting System, Inc. (hereinafter referred to as CBS). I am personally familiar with the activities of CBS in the field of color television, and with the matters and events described herein. I am submitting this affidavit in opposition to the plaintiffs' motion for a temporary injunction and in support of defendants' motions to dismiss and for summary judgment.

2. CBS is engaged in the business of radio and television broadcasting. It owns and operates one television broadcast station, WCBS-TV in New York City, and owns minority interests in WTOP-TV, Washington, D. C., and KTTV, Los Angeles, California. It has recently entered [fol. 1018] into a contract to own and operate, subject to the approval of the FCC, television station KTSL, Los Angeles, and upon such approval, will dispose of its interest in KTTV. CBS also is engaged in sound and television networking, furnishing television network program service to 61 stations. Except for the manufacture of phonograph records through Columbia Records, Inc., a wholly owned subsidiary, CBS is not engaged in the business of manufacturing, distributing or selling any products, and particularly it does not manufacture, distribute or sell television receivers, transmitters or any other television equipment, nor does it manufacture, distribute or sell parts or components for any such equipment.

3. Plaintiffs contend in their various affidavits in support of their motion for a temporary injunction that each of them will, during the relatively brief time during which this Court will have the case under consideration, suffer irreparable injury caused by the fact that, on and after November 20, 1950, the FCC's order adopting standards for the color system developed by CBS will be in effect. Actually, as will readily appear from the facts hereinafter

stated, as well as from the facts in affidavits filed concurrently with this affidavit, plaintiffs will not and cannot, by the continued existence during the period in question of the FCC order, suffer injury, except to their pride and publicity. By contrast, the public is likely to suffer irreparable injury if the order should be temporarily suspended.

[fol. 1019] 4. On the issue of relative injury to plaintiffs and to the public, I shall hereinafter set forth facts establishing the following:

(a) Because of incompatibility (i.e., inability of existing black-and-white receivers to receive color signals in black and white) of the color system for which the FCC adopted standards, because of the permissive nature of the FCC order, and because of the time required for manufacturers to produce color receiving equipment, the advent of color television will be a gradual evolution; there will be no sudden replacement of black-and-white television (paragraphs 5-12).

(b) It is to be noted that to the extent, if any, that plaintiffs will be injured by the broadcasting of color beginning November 20, 1950, that injury is not likely to be avoided by a temporary injunction. This is because in any event, the broadcasting schedule of CBS is not dependent on the effectiveness of the FCC order; hence CBS will, as it is entitled to do, adhere substantially to its proposed color schedule under its temporary experimental license (paragraph 12).

(c) The gradual growth, during the next few months, of color television under the new standards precludes injury to plaintiffs, or any of them, during the interim period. Plaintiff NBC is not affected in its broadcasting activities. Plaintiffs RCA and RCA-Victor Distributing Corporation are not injured, and are not [fol. 1020] likely to be injured in their respective manufacturing and distributing activities particularly because even now, demand for RCA black-and-white sets exceeds supply (paragraph 13).

(d) In any event, to the extent, if any, that there has been any cancellation or diminution of orders for RCA sets, it is at least equally likely that such cancellation or diminution is due to the recently imposed credit restrictions on television sales and to other adverse

factors rather than to the FCC color decision (paragraph 14).

(e) Further, to the extent, if any, that the color decision has adversely affected plaintiffs' sales, the injury is self-inflicted and is due to RCA's adamant refusal, despite ample encouragement and opportunity, to produce equipment which would fully protect its sets from obsolescence and consequent buyer hesitation. Manufacturers and dealers who have taken steps to assure the public of equipment to modify existing black-and-white receivers to enable them to receive color have suffered no diminution in sales; on the contrary, their sales have increased (paragraph 15).

(f) Suspension of the Commission order would however, inflict grave injury to the public by costing it large sums of money, delaying the manufacture of color receiving equipment, and aggravating the problem of incompatibility (paragraphs 16-19).

[fol. 1021] 5. The first basic fact in the light of which the relative injury to the plaintiffs, on the one hand, and to the public, on the other, must be assessed is that color pictures broadcast under the standards adopted by the FCC in the order in question cannot be received by existing standard black-and-white television receivers now in the hands of the public or currently offered for sale. The inability of existing sets, unless modified, to receive color pictures in black-and-white is what is meant by the term "incompatibility." And it is this incompatibility which at once serves as a shield which protects plaintiffs from substantial damage during the interim period and, at the same time, results in a real threat of irreparable harm if there should be a delay in the effectiveness of the FCC order. This is so since, because of incompatibility, as will be shown more fully hereinafter, color broadcasting will initially be limited and hence cannot injure the various enterprises of the several plaintiffs. At the same time, the public is injured because each day of delay denies it the opportunity of making an independent judgment, discourages the manufacture of color equipment, and aggravates the problems and hurdles which the new color system must overcome.

6. The second basic fact in the light of which plaintiffs' claims of damage to themselves must be evaluated is the nature of the order which plaintiffs attack. The sole effect

of the order is to *authorize* a commercial television broadcasting service under the color standards adopted. Only when the FCC adopts such standards may there be a com-
[fol. 1022] mercial service. But the order is not mandatory. Neither plaintiffs nor anyone else is required to do, or not to do, anything, except that plaintiff NBC must transmit, in accordance with the new standards if it wants to engage in commercial color television broadcasting at all. Plaintiff RCA can continue, and, so far as they have stated, is continuing, to manufacture nothing but standard black-and-white sets; plaintiff RCA Victor Distributing Corporation can continue to sell these sets to dealers. The dealers, in turn, can continue to offer these RCA standard black-and-white sets to the public which, of course, can continue to purchase them and, as will be more fully set out hereinafter, can, after such purchase, get use and enjoyment from such sets. NBC can continue to broadcast its black-and-white programs. Neither NBC nor any other broadcaster is required to broadcast any color under the new standards. As will appear more fully in succeeding paragraphs, it is unquestionable that for the next few months at least, therefore, the great bulk of television broadcasting will continue to be under black-and-white standards which can be received on the existing types of receivers which plaintiff RCA manufactures and plaintiff RCA Victor Distributing Corporation sells.

7. A third basic fact bearing on the issue of the relative injury, during the interim period, to plaintiffs on the one hand and the public on the other, is the obvious industrial fact (described more fully below) that it will necessarily take some time for the industry to prepare and tool up to produce receiving equipment capable of receiving the color
[fol. 1023] signals either in color or in black-and-white. It is exceedingly doubtful that any substantial quantity of such receiving equipment will be available during the interim period. Hence, even assuming, contrary to the fact, that plaintiffs RCA and RCA Victor are entitled to protection against the competition created by the offering of such equipment by others, it is entirely unlikely that during the interim period there will be such competition. On the other hand, however, because manufacturing preparation is time-consuming, and because a temporary injunction would inevitably lead to a pause in such prepara-

tions, such an injunction would postpone the date when the public would have the opportunity to purchase such new equipment and to enjoy color television under the new standards.

8. These basic facts—the incompatibility of the system standards for which have been adopted by the FCC, the wholly permissive nature of the FCC's order, and the necessarily preparatory nature of broadcasting and manufacturing activities in the immediate weeks ahead—preclude any possibility of the plaintiffs' asserted irreparable damage during the interim period.

Today, there is only an insignificant handful (certainly less than 1,000) of television receivers capable of receiving either in color or in black-and-white the color signals under the new standards. In sharp contrast, however, there are now between 7,000,000 and 8,000,000 standard black-and-white receivers in the hands of the public capable of receiving all programs broadcast under the existing black-and-white standards adopted by the FCC.

[fol. 1024] Because of the time required to change existing receivers and to manufacture new receivers capable of receiving the color signals, and because of the wholly permissive nature of the FCC order, there can and will in no event be any sudden revolution by which color television will replace present standard black-and-white. Rather, the advent of color will be a process of reasonably gradual and orderly evolution. The pace of that evolution will necessarily be measured by the total of (a) the quantity of receivers *produced hereafter* which will be capable (as present receivers are not now capable) of receiving color signals either in color or in black-and-white; and (b) the number of *existing* receivers which are modified either through *adaptation*, which would make them capable of receiving color signals in *black-and-white*, or through adaptation and *conversion*, enabling them to receive color signals *in color*.

Only as receiving equipment capable of receiving the new color signals comes on the market will there be any significant shift away from standard black-and-white broadcasting to color broadcasting. The appearance on dealers' shelves of such equipment in reasonable quantities is certainly not a matter of days or weeks. Plaintiff RCA itself submitted evidence at the hearing leading to the FCC order that it would take 8 to 10 months after adop-

tion of standards to produce color receivers capable of receiving CBS color signals in color (Ex. 204, Tr. 2586). [fol. 1025] Even manufacturers who have, since the FCC color decision, announced plans promptly to produce receiving equipment capable of receiving the new color signals, have estimated that such equipment will not be available for several months.

Hence, it is obvious that within the next few months, there will be no measurable change in the ratio between the millions of standard black-and-white sets capable of receiving only standard black-and-white signals, on the one hand, and the handful of receivers (whether new or existing sets which have been adapted or converted) capable of receiving color standards, on the other hand. Indeed, because of the present momentum of production of standard black-and-white sets, and the continued large sales thereof, and because, as noted, it will be some time before equipment in quantity capable of receiving the color standards will be produced, the proportion of standard black-and-white sets over color-signal receiving sets will doubtless increase during the next month or two.

It is, therefore, clear that as a simple matter of economics, most broadcasters (left free by the FCC to choose whether to transmit under the old black-and-white standards or the new color standards) will continue, for the next few months, to broadcast the vast majority, and probably all, of their programs under the current black-and-white standards.

9. The television manufacturing industry has explicitly recognized and widely publicized the fact that business [fol. 1026] economics and production capabilities, described in the foregoing section of this affidavit, preclude any sudden curtailment, arising out of the effectiveness of the FCC order on November 20, 1950, of existing black-and-white broadcasting. The unanimous contention of the various manufacturers who have made public statements on the issue since the FCC decision is that black-and-white television will continue in substantially undiminished volume for some time to come, that existing black-and-white receivers are not "obsolete", and that receivers capable of receiving color either in color or in black-and-white cannot be produced in quantity for a number of months.

Unqualified statements to this effect are collected in

Exhibit "A", annexed hereto. Typical excerpts from these statements are as follows:

Raymond C. Sprague, President, Radio-Television Manufacturers Association (an organization whose members comprise almost all the major television receiver manufacturers)—see Exhibit A-1:

> "In fact, because of the many fine television programs that are coming on the air this fall, I believe that present black-and-white television sets are a better investment today than ever before.
>
> • • •
>
> "• • • black-and-white programs will continue to provide the best television entertainment for years to come • • •"

P. V. Galvin, President, Motorola Incorporated (one of the major set manufacturers)—see Exhibit A-2:

> [fol. 1027] *"We feel there is nothing alarming about this decision because it does not affect today's black-and-white television"* (italics as in original)

Ross D. Siragusa, President, Admiral Corporation (one of the major set manufacturers)—see Exhibit A-3:

> "• • • present excellent programming will continue in black-and-white on all four major networks • • • Columbia color and FCC's action means little or nothing to harm growth of television as we know it • • •".

Robert C. Tait, President, Stromberg-Carlson—see Exhibit A-5:

> "1. For years to come the great programs on television will be in black-and-white."

William Balderston, President of Philco Corporation (one of the major television manufacturers), in a statement to Philco distributors—see Exhibit A-6:

> "Color signals will be on the air only during fringe hours on a limited basis from the 107 television stations throughout the country today. Black-and-white

is and will continue to be the basic system of commercial television for years to come.

* * *

"You may advise your customers that they can purchase present Philco television receivers with the knowledge that, should they so desire, these current sets may be converted *at nominal cost* to receive the presently-authorized color signals in black-and-white * * * (italics supplied).

10. Plaintiffs themselves assert that substantial replacement of black-and-white television by color is not an immediate prospect. Thus in paragraph 60 of their complaint, they allege that "New sets designed to receive CBS standards in color will also take time to produce * * *"; [fol. 1028] and paragraph 62 states that "The broadcaster of television programs will have virtually no audience at all in accordance with the CBS standards, neither a black-and-white audience nor a color audience, for a considerable period of time, if ever."

11. While I believe that many of the statements referred to in paragraphs 9 and 10 of this affidavit are unduly pessimistic and exaggerate the remoteness of color broadcasting and the availability of color receiving equipment, they are accurate to the extent that they establish that color under the new standards will not, *at least within the next few months*, substantially affect standard black-and-white broadcasting or the usefulness of existing types of black-and-white receivers. And in this connection, it is significant to note that even when color receiving equipment does reach the hands of consumers, the audience which the broadcaster of standard black-and-white programs can reach is not diminished. This is because all color receiving equipment thus far proposed or suggested leaves unaffected the receiver's ability to receive standard black-and-white. Color is *added* to the receiver; black-and-white is *not* subtracted. Hence, purchase of color receiving equipment does not fragmentize the audience for black-and-white broadcasters.

Conversely, however, as will be set forth more fully hereinafter, purchase of present types of standard black-and-white receivers does diminish the audience for the color

broadcaster, since such receiver, unless modified after purchase, cannot receive the color programs.

[fol. 1029] 12. The lack of immediate impact of color broadcasting on existing standard black-and-white broadcasting is further confirmed by the plans, or lack of them, of existing broadcasters to begin broadcasting under the new color standards. None of the networks other than CBS has given indication that they plan to broadcast color on November 20, 1950, or in the period immediately thereafter.

Even the color broadcasting plans of CBS, while extensive in terms of an inaugural service, are limited when compared to current standard black-and-white broadcasting. These plans are as follows:

Beginning on November 13, 1950, WCBS-TV in New York City will transmit color programs for public demonstration purposes. Its schedule for the week of November 13 is as follows:

November 13, 1950
10:00 - 10:15 AM (broadcast over the air)
11:00 - 11:15 AM (broadcast over the air)
3:15 - 3:30 PM (broadcast over the air)

November 14-18, inclusive
11:00 - 11:15 AM (broadcast over the air)
12:00 - 12:15 PM (broadcast over the air)
1:00 - 1:15 PM (not broadcast—closed circuit—except broadcast Nov. 18)
4:00 - 4:15 PM " " "
6:00 - 6:15 PM " " "

The foregoing schedule will not be on a commercial basis, but will be under WCBS-TV's experimental license [fol. 1030] to broadcast color. It will be seen that on November 13 and 18, there will be 45 minutes of actual broadcast each day, and 30 minutes on each of the remaining days. These broadcasts will be by WCBS-TV only, and will not be supplied to other stations on the CBS network.

The schedule for November 20-24 is as follows:

11:00 AM - 1:00 PM (broadcast over the air)
1:00 - 1:15 PM (not broadcast—closed circuit)
4:00 - 4:15 PM (" " " ")
6:00 - 6:15 PM (" " " ")

The November 25 schedule will be the same as that for November 18.

After the week of November 20, 1950, the CBS color schedule will gradually be expanded until it reaches 20 hours per week beginning on or about December 11, 1950. Of these 20 hours, about 3 hours a day will be during the day-time; one-half hour a day will be between 6 PM and 6:30 PM; and one-half hour a day will be after close of regular black-and-white transmission.

The broadcasts on and after November 20 will (unless a temporary injunction be issued) be on a commercial (as distinguished from temporary experimental) basis under the authority of the Commission's order attacked by plaintiffs. It is important to emphasize, however, that *even if a temporary injunction should be issued, WCBS-TV will substantially adhere to the schedule described above.* It will do so under its experimental authority, but, of course, [fol. 1031] commercial sponsorship of such programs would then be precluded.

Network operations will begin the week of November 20; some of the broadcasts for that week will be made available to WTOP-TV in Washington. Thereafter, additional stations will be fed with the color programs. As is more fully described in the accompanying affidavit of Herbert V. Akerberg, the expansion of network operations will, during the initial period, necessarily be gradual and will depend on the availability of receiving equipment which the stations must acquire and of other equipment which the telephone company must acquire. It is certain that, by the middle of December, only a comparatively few stations will be broadcasting color programs originated by CBS—and each will do so for only about an hour a day.

Since during the initial period of color broadcasting under the new standards there will, as noted, be no color sets available for sale to the public, the broadcasts just described will necessarily be primarily for the purpose of public demonstration rather than for use in the home. CBS has completed arrangements for the lease of a space in New York City, where it will place a number of color receivers, and to which the public will be invited in order that it have the opportunity to acquaint itself with color television under the new standards. CBS will, as soon as possible on or after November 20, 1950, furnish at least two receivers to each of those affiliates who wish to carry

the CBS color broadcasts; it is hoped that these affiliates will also place these receivers in public places.

[fol. 1032] It is obvious, therefore, that for the period following November 20, 1950, and at least to the end of the year, color broadcasting will not significantly diminish black-and-white broadcasting. Indeed, substantially the only effect of color broadcasting during this period will be to permit rather a small percentage of the public to see color television for itself and thus be in a position to make an intelligent choice in deciding what equipment, if any, it wishes to purchase in the light of the Commission order.

13. In the foregoing circumstances, it is exceedingly speculative and remote as to whether there can possibly be any injury to the plaintiffs (even assuming for the sake of argument that if such injury occurs it is such as to entitle plaintiffs, or any of them, to maintain this action) arising out of the mere fact that the FCC order remains in effect from November 20, 1950, to the date of final disposition of this action by this Court. Plaintiff NBC's broadcasting activities, as noted above, cannot be affected at all.

Thus, as noted above, the mere effectiveness of the FCC order cannot affect NBC's broadcasting activities. Nor, as appears from the accompanying affidavit of Oscar Katz, is it likely that the order will substantially affect the sales by plaintiffs RCA and RCA Victor Distributing Corporation of standard black-and-white RCA receivers. Indeed, the RCA distributor in New York City has explicitly stated, following the FCC decision, that "we haven't felt any impact from color at all and can ship out every piece of TV equipment we can lay our hands on"; while another [fol. 1033] RCA distributor reported that dealers, while "mildly upset", had not cancelled or refused deliveries (see affidavit of Oscar Katz).

It should be noted that immediately following the FCC decisions on September 1 and October 10, 1950, there was enormous publicity concerning color television; and there was confusion created by some television receiver manufacturers themselves who issued statements and advertisements distorting both the effect of the FCC order and the nature of the system adopted thereby. Certainly if RCA sales were not substantially affected by these factors, they are not likely to be affected by the mere fact that, pur-

suant to such decision which gave rise to the publicity and confusion, the order adopting standards becomes effective on November 20, 1950.

The improbability of substantial injury to RCA set sales is underscored by the peculiarly favorable circumstances in which RCA finds itself. Its receivers are among the most popular, and there is and has continued to be a heavy demand for them. As the affidavits of Oscar Katz, Grace Olsen (Katz affidavit, Exhibit C) and Sydonia Stanislaw (Katz affidavit, Exhibit D) establish, and as is well known in the industry, it is difficult for customers to obtain RCA sets without a considerable waiting period. Some dealers, in fact, even refuse to take orders for RCA sets because they are in short supply.

Therefore, even if there have been some cancellations of orders, as plaintiffs claim, there is no likelihood that the effectiveness of the FCC order during the interim period will injure the continuity of the production of tele- [fol. 1034] vision sets by RCA or the distribution by the distributing corporation. For if it be assumed (contrary to the *public* statements of RCA distributors) that there have been some cancellations, and if it be further assumed that such cancellations were due to the FCC color action rather than other probable causes (see below), then if this Court should, on final decision, annul the FCC order, it is entirely reasonable to expect that the orders for RCA receivers will be reinstated. The only effect (assuming that there is any) upon the business of RCA and the distributing corporation, therefore, would be that during the interim period between November 20, 1950, and the date of final decision by this Court these plaintiffs might have fewer unfilled orders on their books—but not fewer sales. In these circumstances, plaintiffs' peace of mind may be somewhat affected; but their business would not be.

14. In any event, there are strong indications that any cancellations of orders or diminution of sales which may have occurred in recent days or weeks are not attributable to color televi- on at all, but to other factors which have an adverse affect on sales. As the accompanying affidavit of Oscar Katz shows, many television receivers are bought on the installment plan; in many cases, only nominal down payments were required by retailers and lengthy installment periods were granted. During the last few months, credit restrictions have been imposed. In September, the

Federal Reserve Board required a minimum down payment of 15% and a maximum installment period of 18 months. On October 16, these requirements were amended to provide for a minimum down payment of 25% and a maximum period of 15 months. (See affidavit of Oscar Katz.) In-[fol. 1035] evitably, these requirements have adversely affected sales. The mere fact, therefore, that recent orders for RCA sets may have diminished somewhat is not proof of an effect of the FCC's action in respect of color. Even more likely, as the affidavit of Mr. Katz shows, is that the adverse effect is due to the new credit restrictions and other factors such as a new excise tax and rising receiver prices.

15. In any event, even if plaintiffs RCA and RCA Victor Distributing Corporation were suffering some injury in the form of reduced orders for standard RCA black-and-white television sets, such injury is plainly self-inflicted and could readily have been minimized or even avoided by RCA if it had so chosen. Detailed designs and drawings for both the adaptation and conversion of RCA receivers so that they can receive color either in black-and-white (when adapted) or color (when adapted and converted) have been available to RCA since at least November 1949, when such designs and drawings were admitted in evidence at the hearings (Exs. 216, 217, 225 and 269, Tr. 3460, 4719) and given to RCA.

In fact, on February 27, 1950, in the course of the hearing before the FCC, the Chairman of the FCC expressly suggested to Dr. Elmer W. Engstrom, Vice-President in Charge of Research, RCA Laboratories Division of plaintiff RCA, that RCA and other manufacturers could solve the problem of compatibility for all new sets simply by providing internal adaptation therein (Tr. 6153-5). Witnesses for RCA estimated the costs of such internal adaptation at only \$7-\$10 for manual switching and \$20-\$24 for [fol. 1036] more elaborate automatic switching (Tr. 8558, 10048-49, 10091; Ex. 408, pp. 30-31, Tr. 9617). The President of the Radio-Television Manufacturers Association, who was also an officer of a large television manufacturing corporation, testified that internal adaptation involved a "very minor change" (Tr. 2275), that all the preliminary engineering and design work would take only a few weeks, and that all receivers in production "could have been changed in a day or two" (Cosgrove, Tr. 2273).

Obviously, if RCA had made the simple and inexpensive changes in at least a proportion of its receivers in order to accomplish internal adaptation so that the buyer would have a choice either of purchasing a set capable of receiving only standard black-and-white programs or one capable of receiving *all* programs broadcast, whether black-and-white or color, plaintiffs would now not be faced with the problem, if any, of possible buyer resistance arising out of the fear that color broadcasts could not be received on the RCA sets which are now offered for sale. For if RCA had accepted the suggestion that it include internal adaptation in its receivers, such receivers would be fully "compatible" and could receive all signals in black-and-white, whether transmitted under the black-and-white standards or the new color standards.

Yet although RCA must have known since September 1, 1950, that it was at least likely that CBS standards would be adopted, RCA has refused to produce any internally adapted receivers. The Chairman of the Board of Directors of plaintiff RCA testified flatly that RCA did not plan [fol. 1037] to manufacture internally adapted sets unless the public demanded such sets and thus "prove that it (RCA) is wrong" (Tr. 10048-9, 10419-20, 10428). Thus, in effect, plaintiffs are complaining that their set sales are adversely affected because the Commission adopted an incompatible system. Yet plaintiff RCA refuses to protect itself by making *compatible* sets unless the public proves it is wrong. If, in fact, the public has lessened its buying of RCA sets, it has proven RCA to be wrong. RCA, nevertheless, continues to refrain from producing internally adapted sets; to produce them would, of course, deprive plaintiffs of their central argument against the CBS color system—viz., its incompatibility. Having made that choice, plaintiffs cannot now complain of any injury occurring from its own deliberately chosen course of action.

Nor is it a matter of speculation that the injury (if any) now suffered by plaintiffs in the form of a lessening of orders for its sets could have been, and can still be, avoided. Others in the industry, bent not on destroying the new color standards but rather interested in constructive steps to protect the public against obsolescence, have begun to make provisions for adaptation or conversion of existing standard black-and-white sets. Thus, for example, Muntz TV, Inc. has announced plans for prompt production of units

to convert to color their existing black-and-white sets; as a result, it has suffered no diminution of sales, but, on the contrary, following public announcement of such plans, its sales "doubled or tripled" (see the accompanying affidavit of Earl W. Muntz).

[fol. 1038] Similarly, the Dynamic Stores, a retail chain selling television sets, have widely advertised a guarantee that all sets sold by it would be adapted and converted as soon as possible for $49.50. As a result, the day after such advertisements appeared, the sales by Dynamic of black-and-white receivers *tripled*. (See the accompanying affidavit of Oscar Katz.)

Clearly, therefore, if plaintiff RCA has experienced any diminution of orders for its receivers, it cannot complain. It could have protected itself; it can still protect itself. It prefers, however, to exacerbate the confusion and to aggravate the problem of incompatibility. This Court should not protect plaintiffs from the penalties of their own reckless course of conduct.

16. In sharp contrast to the unlikelihood and insubstantiality of the injury to the plaintiffs, and their power in any event to avoid injury, is the grave injury to the public which would be wrought by suspension of the Commission's order. Briefly stated, such public injury is the very injury which the FCC aimed to avoid by making its decision when it did, rather than delay it for some time as requested by RCA and other manufacturers. That public injury which suspension would cause arises out of the central fact of incompatibility—the inability of receivers now being offered on the market to receive the new color standards unless such receivers are either modified to receive the standards in black-and-white (i.e., adapted) or to receive them in color (i.e., converted).

[fol. 1039] The FCC itself has made decisive findings on this issue. In its First Report (attached as "Exhibit B" to plaintiffs' complaint), the FCC stated that:

> "* * * the mere passage of time overpowers the incompatible system by the sheer weight of receivers in the hands of the public" (Paragraph 148),

and that

> "* * * every day that passes would aggravate the compatibility problem" (Paragraph 151).

Similarly, in its Second Report (attached as "Exhibit G" to plaintiffs' complaint), the FCC concluded that:

> "Nor have these manufacturers suggested any other method whereby the status quo as to compatibility can be maintained if a decision is postponed at the present time. Accordingly, we would be derelict in our responsibility to the public if we postponed a decision any longer. With no way of preventing the growth of incompatibility, the longer we wait before arriving at a final decision the greater the number of receivers in the hands of the public that will have to be adapted or converted if at a later date the CBS color system is adopted" (Paragraph 8).

And, in paragraph 15 of its Second Report, the Commission again emphasized the danger of delay, stating that the consequence of delay to consider new or "improved" compatible systems might be that "the increase in the number of receivers in the hands of the public would make it exceedingly difficult to adopt an incompatible system—a system which we know is satisfactory."

17. The reasons which impel prompt effectiveness of the Commission's order so as to avoid aggravation of the compatibility problem and hence injury to the public are simple and may be briefly stated:

> [fol. 1040] (a) The most recent industry statistics show that standard black-and-white receivers, incapable of receiving the new color standards, are being produced at the rate of 800,000 a month. Unless adapted or converted *after* purchase, broadcasts under the color standards are lost altogether to these receivers; they cannot be received either in color or in black-and-white.
>
> (b) To adapt receivers already purchased by consumers costs from $32 to $50, exclusive of installation costs. The cost of building the necessary additional circuits into a *new* receiver at the factory in order to adapt it (i.e., "internal adaptation") is substantially lower. (First Report, Paragraph 105.) Indeed, as already noted, RCA's own estimates of the retail cost of such internal adaptation is $7-$10.
>
> (c) Similarly, there is a large difference between *converting* existing receivers and manufacturing new receivers with color equipment built into them. The

costs of conversion of 7-inch existing sets in order to produce a (magnified) 10-inch color picture are estimated at $95 to $130 (First Report, Paragraph 106). The total costs of an equivalent new combination color and black-and-white receiver are estimated at $200 (Paragraph 111)—only about $70 more than a black-and-white receiver (Tr. 3513, 3521, 9099).

(d) From the foregoing, the costs to the public involved in the failure to produce new internally adapted [fol. 1041] or new combination color and black-and-white sets can be roughly estimated. To adapt *after* purchase the 800,000 sets now being sold each month would cost $25,600,000 to $40,000,000, plus approximately $8,000,000 additional for installation charges. The added cost involved to the public if such receivers were internally adapted at the factory is only $5,600,000 to $8,000,000. Thus the loss for *adaptation alone* totals between $28,000,000 and $43,600,000 *a month* to the public.

(e) Mere inertia, as well as the added costs just noted, will inevitably result in a substantial number of purchasers of standard black-and-white sets not adapting or converting their sets after purchase. Hence the audience for the color broadcasts will obviously be diminished below the size it would be if internally adapted receivers or receivers already capable of receiving color were on the market. This, in turn, will inevitably retard the expansion of color broadcasting and place additional obstacles in the way of its growth.

18. The injurious consequences described in the foregoing paragraphs 16 and 17 are likely to occur if the FCC's order is suspended as plaintiffs request. Only when the standards become officially effective will manufacturers focus their energies with confidence on the process of tooling up and producing internally adapted and new color sets. On the other hand, manufacturers will be likely to slacken their efforts if the FCC order should be suspended. [fol. 1041-a] That this is so is confirmed by the statement in a speech, broadcast on October 22, 1950, over the CBS network, by Robert C. Sprague, President of the Radio-Television Manufacturers Association, that:

"The recent color decision is now before a Federal court. And it will probably be some time before we

definitely know when or whether the CBS color system will actually be broadcast commercially."

Further, the issuance of a temporary injunction will obviously confuse the public, and is likely to be used by manufacturers and others as a means of propagandizing the public into the belief that there will be no color and hence the public can safely buy ordinary black-and-white sets without fear of obsolescence or added later expense. As already noted, such purchases would, in turn, aggravate the incompatibility problem—which plaintiffs so heavily emphasize—to the grave injury of the public interest.

19. In fact, the inference is inescapable that the real purpose of plaintiffs in seeking a temporary injunction is to fight a delaying action, to keep the public from seeing the new color system so that it can make its decisions as to purchase on a more informed basis, and hence to aggravate the incompatibility problem. Plaintiff RCA has proposed its own allegedly compatible system which was rejected by the Commission. As plainly appears from the "Petition of RCA" (Complaint, Exhibit E), plaintiff RCA is seeking delay in a desperate attempt to improve its own system and cure the fundamental defects inherent in it which the FCC found to exist. Its purposes will be furthered by suspension of the FCC order and by the consequent con-
[fol. 1042] fusion and aggravation of the incompatibility situation. Thus RCA is using this litigation to accomplish precisely what the Commission warned against in Paragraph 148 of its First Report, where it stated:

> "* * * the Commission cannot overlook the obvious fact that one of the easiest methods of defeating an incompatible system is to keep on devising new compatible systems in the hope that each new one will mean a lengthy hearing so that eventually the mere passage of time overpowers the incompatible system by the sheer weight of receivers in the hands of the public."

Obviously, this Court will not lend itself to any such campaign against the public interest.

20. In respect of the allegations of the complaint that the Commission erroneously failed to reopen the hearing and the record to consider a certain document entitled "RCA Progress Report" dated July 31, 1950, and er-

roneously denied a petition by RCA dated October 4, 1950, requesting that the Commission decision be postponed until June 30, 1951, to permit RCA additional time further to develop and demonstrate its system, the following facts should be noted:

(a) The FCC hearing on the color issues closed on May 26, 1950; on June 26, 1950, the parties, including RCA, submitted proposed findings and conclusions; and on July 10, 1950, they submitted replies. RCA circulated its Progress Report on July 31, 1950, but it did not request that the hearing or record be reopened to include the report.

[fol. 1043] (b) On or about August 3, 1950, I received a carbon copy of a letter, dated August 2, 1950, signed by David Sarnoff, Chairman of the Board of Directors of plaintiff RCA and addressed to the Honorable Wayne Coy, Chairman of defendant FCC. A photostat of the carbon copy of said letter is annexed hereto as Exhibit B. In the said letter, General Sarnoff expressed opposition to any delay in the adoption of commercial standards for color television.

The foregoing facts give rise to the clear and obvious inference that RCA's petition of October 4, 1950, and its belated request for consideration of its July 31, 1950, "Progress Report" are mere afterthoughts—makeweights designed only to block the adoption of the new color standards. For General Sarnoff's letter opposing delay was written just after the date of the "Progress Report"; there was no hint in the letter that the record should be reopened to consider it. Indeed, the demand for prompt decision was wholly inconsistent with reopening of the record.

But, of course, on August 2, 1950, when RCA thus wrote opposing delay, RCA did not know that its system would soon be rejected, and that standards for a competing system would be adopted. On October 4, 1950, when it became apparent that the CBS system would be adopted, RCA suddenly abandoned its distaste for delay, and instead, demanded it as a matter of right. Clearly, therefore, plaintiffs' position is that delay is wrong if the decision is favorable to RCA, but delay is all right—and indeed required by law—if the decision is unfavorable to it.

[fol. 1044] Its conduct, thus, is transparent. No such double standard can be countenanced.

21. The allegation in Paragraph 77 of plaintiffs' complaint, alleging that on October 15, 1950, I broadcast a talk "to discourage people from buying present models of television receivers", is inaccurate. My discussion in the said broadcast, in so far as it relates to the question of purchase of television receivers, is set out in its entirety in Exhibit C, annexed hereto. It is obvious from a reading thereof that my talk was neither to encourage nor to discourage the purchase of existing sets. Rather it was to set out certain simple and undeniable facts which would help the consumer to make up his own mind on a more informed basis.

22. In the RCA "Comments" of September 28, 1950, attached to the complaint, plaintiffs repeatedly seek to establish that a report of the so-called Condon Committee is inconsistent with the findings and conclusions of the Commission, and hence the Commission was wrong—or at least, doubt is thrown on its findings and conclusions. A careful reading of the Condon Committee Report and the Commission's Reports will disclose the extent, if any, of these "inconsistencies", and hence it is unnecessary here to comment on them. Certain facts relating to the Report of the Condon Committee should, however, be noted in evaluating plaintiffs' contentions relating thereto.

First, the Condon Committee (officially named the "Advisory Committee on Color Television to the Committee [fol. 1045] on Interstate and Foreign Commerce—United States Senate") was created pursuant to a request of Senator Edwin C. Johnson, Chairman of the Senate Committee on Interstate and Foreign Commerce. That request, set forth in a letter from Senator Johnson dated May 20, 1949, appears in the Report, attached to Exhibit D of the complaint. Senator Johnson requested Dr. Condon to evaluate the "present-day practicability of color television."

As stated at pages 1-2 of the Report, the Committee's conclusions were based on the viewing of demonstrations. As stated at page 1, "The report is confined to technical factors * * * No recommendation for the adoption of a specific system is given, since the committee believes that the decision to adopt a system must include consideration of many social and economic factors not properly the concern of the technical analyst."

While plaintiffs contend that the Condon Committee Report vitiates the FCC's Reports and orders, it is of first significance that Senator Johnson, at whose request the Condon Committee Report was prepared, and to whom it was submitted, had no such difficulties. On the contrary, as will be seen from Senator Johnson's comments, set out in full as Exhibit "D", Senator Johnson fully approved of the FCC action adopting the CBS standards; stating:

> "* * * that report (of the Condon Committee) said unequivocally and with finality that commercial operation of color television is here now.
>
> * * *
>
> [fol. 1046] "* * * it (the FCC) also held that color television is a functioning, commercial reality which in the public interest should be made available to the people of this country now.
>
> * * *
>
> "The Commission is required by law to protect the public interest and promote technical advances in communications art. In my opinion, in this case it has met these responsibilities to the fullest extent possible."

Since, in the light of the Condon Committee Report, Senator Johnson himself thus unqualifiedly approved of the FCC action, plaintiffs are hardly in a position to attack the FCC action on the ground of alleged inconsistency with the Condon Committee Report. That Senator Johnson, for whom the Report was intended, saw no collision between the FCC action and the Condon Report robs plaintiffs' contentions on this score of any significance whatever.

Frank Stanton.

Sworn to before me this 10 day of November, 1950. Emily M. Green, Notary Public, State of New York. No. 31-6638100. Qualified in New York County. Certs. filed with N. Y. Co. Clk. & Reg. Commission Expires March 30, 1952. [SEAL.]

[fol. 1047] EXHIBIT "A"

Statements of Manufacturers and Others in the Television Industry Concerning the Continuance of Black-and-White Broadcasting and the Delay in Production of Sets Capable of Receiving Color

[fol. 1048] EXHIBIT A-1

Excerpts from Statement of Robert C. Sprague, President, Radio-Television Manufacturers Association, Broadcast on October 22, 1950, Over CBS Network.

* * *

"Last Sunday, Mr. Stanton said that manufacturers are trying to create the impression, that the public's investment in television sets is about to be wiped out.

"I don't know any manufacturer who believes that. I don't know any manufacturer who has said anything like that. In fact, because of the many fine television programs that are coming on the air this fall, I believe that present black-and-white television sets are a better investment today than ever before.

"Mr. Stanton told you that some manufacturers are trying to create the impression, that the Commission's decision was sudden, and that, as a result, they are not prepared to build adapters, converters, and new color receivers.

"It is true, that the manufacturers could not believe—until it actually happened—that the Federal Communications Commission would approve a non-compatible color system. They believed—and still believe—that the action was unwise.

"But that isn't the only reason equipment isn't ready. Even minor changes in existing television receivers take six months to make; basic changes take much longer. [fol. 1049] Also, the increasing load, which national defense requirements are placing upon the industry's engineering and production talent, makes production changes even more difficult."

* * *

"As you can well imagine, during the past few days, a lot of people have asked me about the future of television. So I think I know the questions that are in your minds—and I

want to answer them by giving you the best judgment of the manufacturers. These are the men best qualified to know those answers.

"First, will present black-and-white programs continue? And, second, what programs will I get in color? and third, shall I buy the black-and-white set I had planned to buy now.

"There are two primary reasons why we believe black-and-white programs will continue to provide the best television entertainment for years to come. One is our profound conviction—the FCC to the contrary notwithstanding—that the right kind of color television system simply isn't here yet. The second is an equally firm belief that black-and-white television will never be obsolete, even when a sound color system has been developed. As, black-and-white receivers will always cost less, they will appeal to many economy-minded persons. Moreover, the advertisers who sponsor most of the best television programs, will [fol. 1050] never, to any large extent, abandon this mass audience, in favor of a much smaller number of persons, who will be willing to pay extra for color.

"CBS has promised, it will broadcast 20 hours of color per week, but most of these broadcasts, apparently will be in fringe hours, when the average person is at work or asleep, and will not include the popular evening programs.

"And remember, that this broadcasting schedule, in all probability, will be undertaken by only one of the nation's 107 television stations or at the most, by those affiliated with CBS.

"To my knowledge, no other television station has, as yet, indicated any intent or desire, to broadcast even *one* hour of color per week.

"The reason for their caution is, of course, that the CBS system is non-compatible with present black-and-white broadcasts. The minute any station puts on such a color program, it loses its entire audience for that period. Except for the people who will have bought adapters or converters, to tune in on the non-compatible color broadcast.

"Consequently, very few national advertisers, are likely to sponsor color broadcasts in commercially-valuable evening time, unless and until a substantial number of sets have been converted. Conversely, only a few televiewers, [fol. 1051] with cash burning their pockets, are likely to

buy adapters and converters, until an appreciable number of the good programs are broadcast in color."

* * *

"And finally, I tell my friends, that if they are interested in good reception of the better television programs, they can buy black-and-white sets now, with confidence that they will continue to receive these programs for many years to come."

EXHIBIT A-2

Photostat of Copy of Telegram Sent by Motorola, Inc. to Dealers [Name of Addressee Blocked Out]

October 12th-1950

COPY OF TELEGRAM FROM P. V. CALVIN, PRESIDENT
MOTOROLA, INCORPORATED

THIS AFTERNOON THE FCC DECIDED TO FORMALIZE COLOR TELEVISION ON THE BASIC CBS STANDARDS. IF YOU HAVE BEEN FOLLOWING THE RECENT FCC PROCEEDINGS, THIS SHOULD COME AS NO GREAT SURPRISE.

WE FEEL THERE IS NOTHING ALARMING ABOUT THIS DECISION BECAUSE IT DOES NOT AFFECT TODAY'S BLACK AND WHITE TELEVISION. YOU MUST ALWAYS KEEP IN MIND THAT THE PUBLIC INCREASINGLY WELL SERVED BY TODAY'S BLACK AND WHITE TELEVISION STANDARDS AND PROGRAMS, AND WILL CONTINUE TO BE WELL SERVED BY THESE STANDARDS FOR A LONG TIME TO COME. SETS OF TODAY'S DESIGNS AND TODAY'S BLACK AND WHITE TELEVISION PROGRAMS WILL OBVIOUSLY REMAIN THE BACKBONE OF THE TELEVISION BUSINESS FOR AN EQUALLY LONG TIME. TODAY'S TELEVISION SETS REPRESENT A HUGE AND GROWING ADVERTISING CIRCULATION. ALL TELEVISION STATIONS DEPEND UPON THAT CIRCULATION. TODAY'S TELEVISION SPONSORS ARE INTERESTED IN ONLY THAT CIRCULATION. IT WILL BE A LONG TIME BEFORE STATIONS AND SPONSORS WILL FIND A COLOR TELEVISION AUDIENCE. IN FACT, QUOTING FROM PARAGRAPH 12 OF TODAY'S FCC REPORT, QUOTE IF BOTH TYPES OF RECEIVERS ARE OFFERED IT WILL BE THE FORCE OF COMPETITION WHICH GOVERNS WHETHER THE CUSTOMER BUYS COLOR OR BLACK AND WHITE, END QUOTE. I LEAVE IT TO YOU TO DETERMINE WHAT THE PUBLIC WILL CHOOSE CONSIDERING THE MANY DRAWBACKS OF COLOR TODAY, OBVIOUSLY THE GREAT PREDOMINANCE OF BLACK AND WHITE PROGRAMS AND BLACK AND WHITE ADVERTISING CIRCULATION MEANS THAT BLACK AND WHITE TELEVISION WILL PREDOMINATE FOR MANY YEARS TO COME.

FROM A TECHNICAL STANDPOINT SATISFACTORY COLOR TELEVISION ON THE CBS STANDARDS IS STILL A LONG WAY OFF. IT PRESENTLY DEPENDS ON A WHIRLING COLOR DISC TO PROVIDE A COLOR PICTURE. THIS DISC IS IMPRACTICAL FROM MANY STANDPOINTS AND LIMITS THE PICTURE SIZE TO A 12½ INCH TUBE OR LESS WHICH THE PUBLIC ALREADY REGARDS AS TOO SMALL.

THE SUCCESS OF COLOR TELEVISION ON CBS OR ANY OTHER SYSTEM DEPENDS ON THE DEVELOPMENT OF A TRI-COLOR TUBE WHICH DOES NOT EXIST TODAY. IT MAY BE YEARS BEFORE SUCH TUBES ARE COMMERCIALLY PRACTICAL FROM A TECHNICAL AND COST STANDPOINT.

WHEN THE TRADE AND THE PUBLIC UNDERSTANDS THESE MANY RAMIFICATIONS OF COLOR TELEVISION AND WE WILL SEE THAT THEY DO UNDERSTAND THEM, THEN THEY WILL RECOGNIZE WHY BLACK AND WHITE TELEVISION WILL PREVAIL FOR A LONG TIME AND WHY THE EVOLUTION TO COLOR WILL REQUIRE A PERIOD OF YEARS.

THE PUBLIC HAS BEEN HEARING ABOUT COLOR FOR ALMOST TWO YEARS BUT THEY HAVE GONE ON BUYING PRESENT BLACK AND WHITE SETS IN HUGE QUANTITIES TO ENJOY TODAY'S BLACK AND WHITE PROGRAMS. WE ARE CONVINCED THEY WILL CONTINUE TO DO SO.

P. V. GALVIN, PRESIDENT, MOTOROLA, INC.

690

C O P Y

C O P Y

CLASS OF SERVICE DESIRED

DOMESTIC		CABLE	
TELEGRAM		ORDINARY	
DAY LETTER		URGENT RATE	
SERIAL		DEFERRED	
NIGHT LETTER		NIGHT LETTER	

If none of these classes is desired, the message will be transmitted as a telegram or ordinary cablegram.

WESTERN UNION

1207

JOSEPH L. EGAN
PRESIDENT

$	CHECK
S	ACCOUNTING INFORMATION
T	TIME FILED

ALL ADMIRAL DEALERS: OCTOBER 16, 1950

FOLLOWING MESSAGE OF UTMOST IMPORTANCE. QUOTE, REGARDING RECENT FCC COLOR DECISION WE URGE YOU ACQUAINT YOUR CUSTOMERS WITH FACT THAT DECISION ALLOWS FOR CONTINUATION DUAL STANDARDS OF TELECASTING WHICH MEANS THAT PRESENT EXCELLENT PROGRAMMING WILL CONTINUE IN BLACK AND WHITE ON ALL FOUR MAJOR NETWORKS. IMPRACTICAL UNSIGHTLY WHIRLING DISC SYSTEM WHICH COMMISSION APPROVED WILL BE PUSHED ONLY BY CBS NETWORK OWNING FOUR STATIONS OUT OF A NATIONAL TOTAL OF 107. NO SPONSOR WILL MAKE ANY INVESTMENT COLOR TELECASTS FOR AUDIENCE WHICH WILL CONSIST MAINLY OF CBS EXECUTIVES. IT IS OUR PREDICTION CBS COLOR WILL BUMBLE ALONG FOR A FEW MONTHS AFTER WHICH TIME COMPATIBLE ELECTRONIC SYSTEM WHICH CAN BE UTILIZED BY PRESENT RECEIVERS WILL BE PERFECTED. THEN CBS RECEIVERS WILL BE COMPLETELY OBSOLETE. IN VIEW THESE FACTS WE URGE YOU REASSURE PUBLIC THAT COLUMBIA COLOR AND FCC'S ACTION MEANS LITTLE OR NOTHING TO HARM GROWTH OF TELEVISION AS WE KNOW IT. ADMIRAL IS PROUD OF WAY YOU TELEVISION DEALERS, AMERICA'S HARDEST HITTING SALES FORCE HAVE STEADILY INCREASED YOUR BUSINESS IN SPITE OF OBSTACLES BUREAUCRATS HAVE CONSTANTLY THROWN YOUR WAY.
ROSS D. SIRAGUSA, PRESIDENT, ADMIRAL CORPORATION, UNQUOTE.

THE KANE COMPANY

Photostat of Copy of Telegram Sent By Admiral Corporation to Dealers

EXHIBIT A-3

Advertisement of General Electric
(New York Times, October 25, 1950, p. 29)

Nobody is going to obsolete over 100 million dollars worth of TV

WHY have over eight million families purchased television receivers? The answer is entertainment. Yes, the world's greatest entertainment—available night after night, day after day in an ever-growing cavalcade including drama, variety, comedy, music, news, sports, service and children's shows, *costing over 100 million dollars a year*. It's a fact that no other form of television can so richly reward its owners now or for a long time to come.

So buy your new TV set in confidence that nobody is going to obsolete 100 million dollars worth of TV entertainment. And be sure you see the newest from General Electric featuring life-size, real-as-life pictures at prices the average family can afford. Today, as always, you can put your confidence in General Electric.

THE GREATEST SHOW ON EARTH
Costing over 100 Million Dollars
Is Yours on Today's TV!

VARIETY
Texaco Star Theatre
Toast of the Town
Colgate Comedy Hour
Your Show of Shows
Hit Parade
Arthur Godfrey Talent Scouts
Vaughn Monroe Show
Little Show
Benny Meid Variotiei
This Is Show Business
Garroway at Large
Mohawk Showroom
Star Time
Fred Waring Show
Kaz Murray Show
Frank Sinatra Show
Alan Young Show
Showtime U.S.A.
Billy Rose Show
Holiday Hotel
Broadway Open House
Jack Carter Show
Cavalcade of Stars
Paul Whiteman's Revue
Don McNeill TV Club

MYSTERY DRAMA
Treasury Men in Action
Martin Kane Show
Suspense
The Web
The Clock
The Plainclothesmen

SPORTS
National Pro Football
Gillette Cavalcade of Sports
Roller Derby
Wrestling
Stock Car Racing

DRAMA
Fireside Theatre
Ford Theatre
The Goldbergs
Big Story
Armstrong Theatre
Studio One
Mama
Lone Ranger
One Man's Family
Aldrich Family
Gene Autry Show
Philco Television Playhouse
Robert Montgomery Presents
Kraft Television Theatre
Lux Video Theatre
Pulitzer Prize Playhouse

PARTICIPATION
Original Amateur Hour
Stop the Music
Break the Bank
What's My Line
Truth or Consequences
Blind Date

CHILDREN
Howdy Doody
Super Circus
Kukla, Fran & Ollie
The Big Top
Captain Video
Smilin' Ed McConnell

INTERVIEWS
Faye Emerson Show
We the People
Wendy Barrie Show

Advertisement of Stromberg-Carlson
[New York Herald Tribune, October 26, 1950, p. 14]

A message from Stromberg-Carlson about color television

No doubt you have planned to buy a television receiver this fall—and now you are wondering about color.

Actually, there is not much to wonder about. The facts are simple:

1 For years to come the great programs on television will be in black and white.

2 Some day, color may also have a place in television programming, just as you now see some movies in color.

3 If and when color telecasting becomes a factor in your community, this supplementary broadcasting service can be received in color by adding a suitable converter to current Stromberg-Carlson television models.

Yes, you can buy today—with confidence. So why wait? Why pass up all the fine entertainment that is yours *right now*? Why not start tomorrow to enjoy the pleasure television will add to your family life?

Robert C. Tait
PRESIDENT

In television . . . today or tomorrow . . .

"There is nothing finer than a STROMBERG-CARLSON."

EXHIBIT A-6

Statement of William Balderston,
President of Philco Corporation

October 16, 1950

WILLIAM BALDERSTON, PRESIDENT OF PHILCO, RELEASED FOR PUBLICATION THIS STATEMENT SENT TO ALL PHILCO DISTRIBUTORS:

"COLOR TELEVISION HAS NOT ARRIVED. MUCH CONFUSION AND MISINFORMATION HAVE RESULTED FROM THE EXAGGERATED PUBLICITY SINCE THE RECENT FCC ACTION. COLOR SIGNALS WILL BE ON THE AIR ONLY DURING FRINGE HOURS ON A LIMITED BASIS AND WILL IN NO WAY INTERFERE WITH THE ESTABLISHED PROGRAM SERVICE FROM THE 107 TELEVISION STATIONS THROUGHOUT THE COUNTRY TODAY. BLACK AND WHITE IS AND WILL CONTINUE TO BE THE BASIC SYSTEM OF COMMERCIAL TELEVISION FOR YEARS TO COME.

"WHILE THE COMMISSION HAS AUTHORIZED TRANSMISSION OF A COLOR SYSTEM, ITS REPORT LEAVES THE DOOR WIDE OPEN FOR FURTHER DEVELOPMENT. PHILCO BELIEVES THAT THE PRESENTLY PROPOSED SYSTEM WITH ITS AWKWARD MECHANICAL WHIRLING DISK AND SMALL SIZE PICTURES IS ENTIRELY UNACCEPTABLE TO THE PUBLIC AND THAT THE ONLY COLOR TELEVISION THE PUBLIC WILL BUY IN VOLUME IS THAT WHICH KEEPS PACE WITH CURRENT ELECTRONIC DEVELOPMENTS IN BLACK AND WHITE. THAT KIND OF COLOR WITH ITS BIGGER PICTURES, FINER QUALITY AND PERFORMANCE IS BEING PERFECTED IN THE LABORATORIES OF THE INDUSTRY TODAY. IT IS OUR FIRM CONVICTION THAT THIS IS WHAT WILL EVENTUALLY REACH THE MARKET FOR DEALERS TO SELL WITH FULL ASSURANCE OF SATISFACTION TO THEIR CUSTOMERS. AND WE BELIEVE FURTHER THAT SUCH A COLOR SYSTEM IS AT LEAST TWO YEARS AWAY.

"YOU MAY ADVISE YOUR CUSTOMERS THAT THEY CAN PURCHASE PRESENT PHILCO TELEVISION RECEIVERS WITH THE KNOWLEDGE THAT, SHOULD THEY SO DESIRE AT ANY TIME, THESE CURRENT SETS MAY BE CONVERTED AT NOMINAL COST TO RECEIVE THE PRESENTLY-AUTHORIZED COLOR SIGNALS IN BLACK AND WHITE. IF AND WHEN COLOR PROGRAMS MAY WARRANT THE EXPENDITURE, EQUIPMENT FOR THESE SETS CAN BE MADE AVAILABLE AT HIGHER COST TO PERMIT RECEPTION OF THOSE PROGRAMS IN COLOR. SO YOUR CUSTOMERS CAN CONTINUE TO BUY PHILCO TELEVISION TODAY WITH THE FULL ASSURANCE THAT THEY WILL RECEIVE A COMPLETE TELEVISION SERVICE FOR THE FUTURE.

"YOU MAY FURTHER ADVISE YOUR DEALERS THAT WHILE MATERIAL SHORTAGES ARE BECOMING INCREASINGLY CRITICAL, WE ARE CONTINUING FULL SCALE PRODUCTION OF PHILCO TELEVISION SETS. WITH PUBLIC PREFERENCE FOR PHILCO AT AN ALL-TIME HIGH, WE MUST ALSO CONTINUE TO ALLOT OUR PRODUCTION ON AN ALLOCATION BASIS."

EXHIBIT A-7

Advertisement of Raytheon Television
(New York Times. October 23. 1950. p. 16)

96?

PART OF A SERIES . . . *Giving you THE TRUTH ABOUT TELEVISION—for people who now own television sets and those who plan to buy one soon*

WHAT ARE THE STRAIGHT FACTS ABOUT COLOR TELEVISION?

What's behind the recent FCC color decision? Why was the CBS color system selected at this time? Is the CBS system permanent or temporary? How will the FCC decision affect present TV sets? How much will it cost to convert present TV sets to color? Which programs will continue on black-and-white TV—which on color? Should you buy a new TV set now, or wait? How soon might color come?

These and many more questions are of vital importance today to the American public—and to dealers, distributors and manufacturers. All kinds of claims are being made. Nobody seems to agree. Everyone is confused.

The following questions and answers are published to help clear up the confusion, and to give you the facts you need to make up your mind. To the best of our knowledge and intent the information that follows is correct and contains no misleading statements.

Q. What does the recent FCC color decision mean?

A. The Federal Communications Commission decision in favor of the CBS color television system simply means that the Commission believes that the color system developed by the Columbia Broadcasting System is good enough to put on the air—and that any TV station that wants to can transmit color pictures using CBS "standards"—technical specifications on how to send and receive color pictures. There is absolutely nothing in the decision to compel the broadcasters to transmit color television.

Q. What is the CBS method?

A. The Columbia Broadcasting System method of color telecasting is a means of broadcasting color by transmitting each of the primary colors. To do this, they use a complicated optical device, which picks up these primary colors—red, blue and green—in the camera, one after the other, as the transmitter can send them over the air. Then, to receive a color picture, there must be a rotating color filter wheel in front of your TV screen, synchronized so that the correct color filter is in front of the picture tube at exactly the right time. Thus, red, blue and green pictures appear on your screen fast enough to blend together so that your eye sees them as a full color picture.

Q. If the CBS method is temporary, why was it selected at this time?

A. Right or wrong, the FCC felt that some sort of color television should be started now, whether or not it proved to be the final method. In addition they felt that any delay in the adoption of a non-compatible system might result in the obsolescence of even more sets than the 8,000,000 now in use. After examining the color systems of CBS, RCA and Color Television, Inc., the FCC decided [illegible] that color television is today where black-and-white television was in 1927. This might be right or wrong.

Q. Is there a good chance that an all-electronic color system will come fairly soon?

A. Frankly, while we don't know for sure, we believe it will. It is certainly a possibility. CBS has made an important contribution to color television. But almost all electronic engineers believe that CBS color will be followed by an improved all-electronic system, just as the old whirling disk was followed by the present "all-electronic" black-and-white system. An all-electronic system could and certainly should be compatible—meaning color pictures could be received on black-and-white on present [illegible] sets without an adapter.

Q. Will I still be able to see the top shows—like Milton Berle, Bob Hope and Wayne King—on black-and-white TV on my regular set?

A. Yes, for at least several years. There won't be many color receivers for some time. And the CBS system is incompatible; it cannot be received by today's 8,000,000 TV receivers. Most advertisers cannot afford to pay for good shows that reach only a limited number of people; they must have large audiences for the greatest return on their investment.

Q. Will my present TV set be able to receive black-and-white pictures from color programs if CBS starts telecasting them in my city?

A. No. The CBS system is not compatible—which means that its color pictures can not be received on existing sets as a black-and-white picture.

Q. What effect will the color decision have on regular black-and-white telecasts?

A. Not much, at least for several years. Your favorite programs will continue to be broadcast in black-and-white for a long time. Even CBS says that black-and-white TV and color TV will exist side-by-side for some time to come.

Q. What effect will the color decision have on regular black-and-white telecasts?

A. Not much, at least for several years. Your favorite programs will continue to be broadcast in black-and-white for a long time. Even CBS says that black-and-white TV and color TV will exist side-by-side for some time to come.

Q. Will I still be able to see the top shows—like Milton Berle, Bob Hope and Wayne King—on black-and-white TV on my regular set?

A. Yes, for at least several years. There won't be many color receivers for some time. And the CBS system is incompatible; it cannot be received by today's 8,000,000 TV receivers. Most advertisers cannot afford to pay for good shows that reach only a limited number of people; they must have large audiences for the greatest return on their investment.

Q. Will my present TV set be able to receive black-and-white pictures from color programs if CBS starts telecasting them in my city?

A. No. The CBS system is not compatible—which means that its color pictures can not be received on existing sets as a black-and-white picture.

some time to come. Why? Even CBS has indicated that it is not yet practical to produce a larger filter wheel. The filter wheel must be at least twice the size of the screen. Thus a 16 inch screen would need a wheel more than 3 feet in diameter, and the outside edge of such a whirling disk would travel approximately 142 miles per hour. Thus large-screen sets (14 inch and up) which the public prefers must have their pictures reduced to 12½ inches by the converter. Right now you can't have both a large picture and color. Present indications are that the cost of such a conversion would not be less than $200.

Q. After I have had my set converted, have I any assurance that this will be the final color system?

A. No. The CBS whirling disk in front of your screen may be replaced in a few years or may be sooner by a more efficient all-electronic and possibly compatible system.

Q. Is there a color method being developed that is compatible—meaning I could receive color telecasts in black-and-white without any changes in my set?

A. Yes, several methods are in process of development that would do just that. They're called "all-electronic"—require no mechanical filter wheels, are not limited by picture size, and are compatible, i.e., you could receive color telecasts in black-and-white with no adapter necessary. Two of these methods use special "Tri-color Tubes", and appear to offer several advantages. Both eliminate the bulky rotating wheel now necessary in a CBS converter. You can get a larger color picture—16 inches or more. Certain problems such as limited brightness, flicker and rainbow hued edges of moving objects must be overcome before these systems can be perfected. Raytheon engineers are working on these systems, and we hope to be able to produce a set using one of them in the future.

Q. Should I buy a TV set now or wait for a color set?

A. That's entirely up to you. If you are an adventurous soul and are willing to spend your money on what may turn out to be an expensive experiment, then wait for one of these color sets which may be available next year. If you do, probably for an hour or so in the early afternoon or late evening there will be some color telecasting on a sustaining basis. Top-notch programs will continue to come through as black-and-white pictures. However, if you want high-grade entertainment, which will be predominant on TV for several years to come, and will choose a TV set that has achieved a high degree of perfection in performance and dependability, by all means go ahead and buy today's TV set—one from a reliable manufacturer.

Q. What is Raytheon going to do?

A. *Naturally, we are following a flexible policy—*

(1) We will continue to make TV sets that give you excellent black-and-white pictures. These sets, however, will be provided in the near future with a plug connection for an adapter or converter.

(2) We have the design of an adapter in process, which can be connected to these sets simply by plugging in. It should be in production during the first half of next year.

(3) For Raytheon sets manufactured since Jan. 1, 1950, we will have a "field kit" containing connection plug and other necessary parts, which your Raytheon serviceman can install on your set for a small fee.

(4) We will market a color converter as soon as the programming and public acceptance of color makes such a course feasible.

(5) When and if the public demands it, Raytheon will produce a full-color set.

We choose this policy because it eliminates any possibility of obsolescence of Raytheon sets now in use, and it assures complete adaptability of any future Raytheon sets to existing conditions.

Since you, the consumer, will have to live for probably 25 to 50 years with the standards that are finally adopted by the Federal Communications Commission, we insist that the best possible color standards be adopted. We do not believe that the present CBS method is the final answer.

★ ★ ★

[fol. 1060] EXHIBIT A-8

Other Statements Reported in "Broadcasting-Telecasting" (a leading trade magazine), October 23, 1950

"J. R. Poppele, vice president WOR-TV New York and president of Television Broadcasters Assn., said, it 'may take some years' before color television can 'attain the magnitude of the present black-and-white service.'

" 'Adoption by the FCC of standards for color television in no way interferes with the continued broadcast of black-and-white television programs by the nation's 107 television stations. . . .

" 'At the present time only one of the 107 television stations is equipped to transmit color images on the basis of the new standards. The number of color television sets or converters and adapters (which are required for color reception on present sets) currently on the market are less than 100. . . . It may take some years before color television can attain the magnitude of the present black-and-white service, which is reaching 35 million people in 65 of the nation's leading markets. Conversion to color is required both in the studio and receiver. Both will be gradual. The process may be slowed by the exigencies of the present national emergency.' "

"E. K. Jett, director of television, WMAR-TV Baltimore and formerly chief engineer and member FCC, answered the question 'Shall I buy a TV set now?' with an emphatic 'Yes.' 'Later, but not soon,' he added, 'you might have to buy a small attachment to receive color programs as black-and-white pictures.' No station has been ordered [fol. 1061] to transmit color, he said, and no color equipment, transmitting or receiving, is available at this time in the Baltimore area. However, he pointed out, it would be possible for all three of Baltimore's TV stations to transmit color programs from New York where CBS is equipped to originate and feed color signals to Baltimore by coaxial cable."

"George B. Storer, president Fort Industry Co., warned a group of television dealers and distributors that color TV is still a long way in the future and the 'color situation should not stop them (the public) from buying a receiver now if they want one.' 'I don't mean to deprecate color

telecasting,' he continued, 'but every effort will be for better black-and-white pictures for local set owners. The very limited color programs we will carry will be for the "hams" or amateurs who want to experiment with their own receivers, but in no way will upset our programming in black-and-white pictures.'"

"Arthur A. Brandt, general sales manager, General Electric Receiver Division, told dealers black-and-white television programs will remain the backbone of the TV business for many years to come and color television will be supplementary and probably limited to one station in New York City for an indefinite period. 'No one knows how long it will take to engineer, develop and produce the highly complicated television station equipment needed to originate color telecasts outside New York, he continued. 'While conversion is possible we do not believe that many people [fol. 1062] will want to convert their sets until color broadcasts offer a real added service,' he said. Color sets will be considerably higher in cost, he pointed out."

"Leonard Ashbach, president, Majestic Radio & Television, said his company would build adapters and converters as soon as there is public demand for them and as soon as components are 'readily available.' Mr. Ashbach said there was no need for haste in the matter because 'even if CBS color goes on the air next week it will be at least two to three years before color telecasts will measure up with the quality of entertainment that we now enjoy on black-and-white receivers.' He said prospective television buyers need not hesitate to purchase present black-and-white sets 'because TV stations will continue to telecast black-and-white programs as long as sponsors are willing to pay for same.'"

[fol. 1063] EXHIBIT B

Letter from David Sarnoff to Honorable Wayne Coy, August 2, 1950

RADIO CORPORATION OF AMERICA

RCA Building,

30 Rockefeller Plaza, New York 20, N. Y.

August 2, 1950.

Copy

The Honorable Wayne Coy, Chairman, Federal Communications Commission, Washington, D. C.

DEAR CHAIRMAN COY:

We write with reference to the color television matter which is pending before the Commission.

Items have appeared in the trade press that there are those who are in favor of delay in the disposition of this matter by the Commission.

On behalf of RCA and NBC we wish to reiterate that we have not and do not favor any delay in the establishment, by the FCC, of commercial standards for color television.

Sincerely yours, Radio Corporation of America. By David Sarnoff, Chairman of the Board.

[fol. 1064] EXHIBIT C

Excerpts of October 15, 1950, Broadcast Relating to Purchase of New Sets

* * *

"First, as I have already pointed out, present sets can be adapted at reasonable cost to give black-and-white pictures from color broadcasts.

"Second, all future black-and-white sets can be manufactured at an even lower added cost to provide built-in compatibility for every future purchaser. You who are concerned with compatibility and want to buy a black-and-white

set after the next month or so may well want to insist that the set you buy includes this feature."

* * *

"This leaves just one more question which I am sure many of you are asking:

> 'Should I buy an ordinary black-and-white television set at this time?'

I cannot give you a flat answer, because the answer may vary with your preferences and your pocket-book. But I can give you some facts which may help you make up your own mind.

"The first fact is that present black-and-white sets now on the market will continue to receive present black-and-white programs. These programs will continue for a considerable period of time, although at a diminishing rate within a year or so.

[fol. 1065] "The second fact is that most sets now on the market can be adapted, so that when there is color broadcasting, the program will be received in black-and-white. And, of course, the sets can be converted to receive color broadcasts in color.

"Therefore, if the manufacturers give you their word that there will soon be available adapters and converters for the particular black-and-white sets which you are considering, you will have protection against obsolescence.

"On the other hand, I want to point out that it will be somewhat cheaper and more satisfactory to buy a black-and-white set which is already adapted, so that it has built-in compatibility. Furthermore, a new combination color and black-and-white set may be somewhat less expensive and will be more satisfactory than an ordinary black-and-white set adapted and converted for color.

"Therefore, if you wait for, say, six months, you may save some money, and you will have a self-contained set with built-in compatibility and built-in color. On the other hand, if you buy an ordinary black-and-white set now, you will be able to enjoy the black-and-white programs being broadcast. But, if you do buy such a set, buy only from a manufacturer who will give you positive assurance that there will soon be adapters and converters which will enable you to get color."

[fol. 1066] EXHIBIT D

Statement (Oct. 19, 1950) of Senator Edwin C. Johnson, Chairman, Senate Committee on Interstate and Foreign Commerce.

"Concerned with the highly technical nature of the controversy over color television, eighteen months ago the Senate Committee on Interstate and Foreign Commerce called on the National Bureau of Standards to advise the Congress, and through Congress the people of the United States, on the scientific status of color television. Accordingly, Dr. Edward U. Condon, Director of the Bureau, appointed a committee of five impartial, highly qualified scientists of recognized ability, to study every phase of the problem and prepare a report. That committee of scientists examined every proposed system of color television, conferred with electronic experts, analyzed the nine months of testimony before the Federal Communications Commission and personally witnessed field and laboratory demonstrations of various systems, and in July of 1950 submitted its report. That report said unequivocally and with finality that commercial operation of color television is here now.

"On September 1 of this year, two months after the report of this expert committee had been filed and after nine months of exhaustive hearings and demonstrations, the Federal Communications Commission issued its first order in the color television case. It also held that color television is a functioning, commercial reality which in the public interest should be made available to the people of this [fol. 1067] country now. Of the three principal systems considered, the Commission found that Columbia's was the best that had been demonstrated. It proposed therefore to adopt standards for color television premised on Columbia's system, but to leave the door open to the development of competing color television systems and added that if television set manufacturers would build new sets capable of receiving Columbia's color signals, it would hold in abeyance a final order adopting the Columbia system.

"However, instead of going along with the commission and cooperating sympathetically in solving a most difficult problem the manufacturers organized a sit-down strike. The obvious and sensible thing, of course, would be for

worth of TV entertainment!

Frank Sinatra Show
Alan Young Show
Showtime U.S.A.
Billy Rose Show
Holiday Hotel
Broadway Open House
Jack Carter Show
Cavalcade of Stars
Paul Whiteman's Revue
Don McNeill TV Club

MYSTERY DRAMA

Treasury Men in Action
Martin Kane Show
Suspense
The Web
The Cloak
The Plainclothesmen

SPORTS

National Pro. Football
Gillette Cavalcade of Sports
Roller Derby
Wrestling
Stock Car Racing

Lux Video Theatre
Pulitzer Prize Playhouse

PARTICIPATION

Original Amateur Hour
Stop the Music
Break the Bank
What's My Line
Truth or Consequences
Blind Date

CHILDREN

Howdy Doody
Super Circus
Kukla, Fran & Ollie
The Big Top
Captain Video
Smilin' Ed McConnell

INTERVIEWS

Faye Emerson Show
We the People
Wendy Barrie Show

You can put your confidence in—

GENERAL ELECTRIC

692

them to abandon their political activity and their announced propaganda campaign and put their heads together to develop a color television system more to their liking. No one can make me believe that they cannot do so should they pool their great scientific resources. Since no assurances were forthcoming from the manufacturers that such sets would be built and made available for purchase by the public, at the conclusion of the thirty day period set by the Commission it issued its second report. As I understand this second order, it has these present and future implications:

"1. The broadcasting of color television for the present is to be permissive and not mandatory. Consequently color programs will be available only over a relatively few sta-
[fol. 1068] tions and then largely during the hours of the day when existing major black and white programs are not on the air.

"2. It does not require stations to broadcast a specific minimum amount of color programs which would require a further long drawn out rule-making hearing and meanwhile, the permissive arrangement would enable the Commission to see how color television is received by the public.

"3. The Commission's second order like its first does not close the door to the development, or the authorization, of other color systems, compatible or otherwise. To the contrary, the Commission emphasizes that it stands ready and willing to give the fullest consideration to improvements or new systems whenever they may be developed.

"4. Since the Commission's order permits the operation of both color and black-and-white, with the latter obviously remaining the prevailing system on most stations, the market is left wide open for a free choice by buyers giving the scientific, industrial, and competitive elements free play to settle the issue. This is in the best traditions of the American anti-monopoly, free enterprise system.

[fol. 1069] "5. The hue and cry is that by the end of this year about 10,000,000 black-and-white sets will be in use and their owners will either have to buy converters and adapters or not receive color broadcasts. The only way the Commission's order affects them is to make it possible for them to have color television if they want it. What is so wrong about that? The Commission's decision obviously is designed to give consideration to approximately 75 per-

cent of the population of this country. It must be remembered that 60 percent of our people reside in areas where there is no television at all. Moreover, even in the area where there is now television, approximately two-thirds of the families still do not have sets. Why should they be denied the right to purchase sets capable of receiving color television if they want to do so? The Commission is required by law to protect the public interest and promote technical advances in the communications art. In my opinion, in this case it has met these responsibilities to the fullest extent possible.

"It should be noted that the Commission is now going forward with its television channel allocation hearings, which when completed, will result in lifting the existing freeze on new stations. This will open up a vast new market six to twelve months hence when hundreds of new stations will begin operation in areas where now there is no television. The viewers in those sections are entitled to be able to buy sets which will allow them to receive color programs if they want that kind of a set and the new broadcasters in the new areas are entitled to be able to buy and install color [fol. 1070] broadcasting equipment if that is their wish. I repeat, for the present the Commission's order is permissive and is not mandatory.

"Stripped of all the cooked-up hurricane of confusion the Commission's orders merely insist upon a 'buyers choice'. Always there has been resistance to new things by selfish interests but always, thanks be to progress and Providence, that opposition has been brushed aside and the people have been served."

[fol. 1071] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

AFFIDAVIT OF HERBERT V. AKERBERG—Filed November 13, 1950

STATE OF NEW YORK,
County of New York, ss:

Herbert V. Akerberg, being duly sworn, deposes and says:

1. I am Vice-President of the Columbia Broadcasting System, Inc., in charge of station relations. In this ca-

pacity, I directly supervise relations between the CBS television network and the television stations which are affiliated with CBS and which carry its network programs. My functions include supervision of negotiations on behalf of CBS with such stations in respect of which network programs, if any, such stations will carry originated by CBS.

2. On November 2 and 3, 1950, I consulted by telephone with a number of CBS television affiliates in various cities in order to offer to such stations the color programs which CBS will broadcast beginning November 20, 1950. Begin- [fol. 1072] ning on that date, the following color broadcast schedule will be made available to CBS affiliates connected by coaxial cable:

Monday through Saturday—11:00 AM-1:00 PM; 6:00 PM-6:30 PM; 11:30 PM-Midnight;

Sunday—11:00 AM-1 PM; 11:30 PM-Midnight.

The foregoing schedule was offered to various stations in whole or in part. In order for these stations to broadcast these color programs transmitted via the coaxial cable, it will be necessary in each instance for the station to procure and install:

(1) a color monitor,
(2) a hum depresser, and
(3) a number of color receivers.

In general, delivery of such equipment is approximately 45 days from date of order.

3. As a result of my conversations on November 2 and 3 with representatives of the various television affiliates, it appears that the following stations will carry the following color programs:

a. *Washington, D. C.* As a result of arrangements with John Hayes, Vice-President and General Manager of [fol. 1073] WTOP-TV, Washington, D. C., that station will, beginning November 20th, broadcast the CBS color programs in Washington between 11:00 AM and 1:00PM daily, except Sunday. CBS will furnish WTOP-TV sufficient equipment plus four color receivers until such time as WTOP-TV procures its own equipment. WTOP-TV plans to locate the receivers at such places as will make it pos-

sible to demonstrate the color broadcasts to the greatest number of viewers possible.

b. *Baltimore, Maryland.* Arrangements have been made with E. K. Jett, Vice-President and General Manager of WMAR-TV in Baltimore, Maryland, to broadcast as large a portion as possible of the CBS 11:00 AM to 1:00 PM color schedule. WMAR-TV will carry the entire two hours whenever its black-and-white broadcasting schedules permit. However, because of unavailability of equipment, WMAR-TV will not begin broadcasting color by that date. The station has ordered the necessary equipment and during the interim period before actual delivery, CBS will endeavor to furnish temporary equipment to WMAR-TV. Such temporary equipment cannot be supplied until at least two or three weeks after November 20th.

c. *Philadelphia, Pennsylvania.* As a result of conferences with J. L. Tinney, Assistant General Manager of WCAU-TV, the same arrangements have been made with that station as have been made with WMAR-TV in Baltimore. WCAU-TV has ordered permanent equipment.

d. *Boston, Massachusetts.* Through arrangements with Linus Travers, Executive Vice-President and General [fol. 1074] Manager of WNAC-TV Boston, Massachusetts, substantially the same schedule is contemplated as for WMAR-TV and WCAU-TV. WNAC-TV will carry the CBS color broadcasts for one hour, probably between 12:00 noon and 1:00 PM.

e. *Cincinnati, Ohio.* Through arrangements with U. A. Latham, Station Manager, WKRC-TV will carry some part of the CBS 11:00 AM to 1:00 PM color schedule as soon as equipment now on order has been delivered and installed.

f. *Dayton, Ohio.* Through arrangements with J. Leonard Reinsch, General Manager, WHIO-TV will broadcast some part of the CBS 11:00 AM to 1:00 PM color schedule as soon as equipment can be delivered and installed.

g. *Louisville, Kentucky.* Through arrangements with Victor Sholis, Director, WHAS-TV will broadcast some part of the CBS 11:00 AM to 1:00 PM color schedule as soon as equipment can be delivered and installed.

h. *Chicago, Illinois.* As a result of arrangements made by William A. Schudt, Director of Station Relations, with John H. Mitchell, General Manager, WBKB, Chicago,

Illinois, will broadcast one-half hour daily of the CBS 11:00 AM to 1:00 PM color schedule and will also broadcast the CBS color program between 6:00 and 6:15 PM each day. In addition, WBKB wishes to install sufficient color pickup equipment to enable that station to originate color programs in Chicago and supply them to the network. The starting date for the foregoing schedule is dependent on the delivery of necessary transmitter equipment.

[fol. 1075] i. *Detroit, Toledo, Atlanta.* As a result of arrangements with George B. Storer, President, Fort Industry, Inc., the stations owned and operated by that company in Detroit, Toledo and Atlanta will broadcast an unspecified portion of the CBS color schedule when equipment becomes available.

In each of the cities listed in the foregoing paragraph, the stations plan to install several television receivers in public places and in department stores for the purposes of public demonstrations. The stations other than WTOP-TV in Washington and WMAR-TV in Baltimore will probably not be on the air with CBS color broadcasts until 45 days to two months from the present—the time necessary to procure equipment. It is my opinion that within two to four months from the present, approximately 20 CBS interconnected television affiliates will be broadcasting some or all of the CBS color network schedule.

Herbert V. Akerberg.

Sworn to before me this 10th day of November, 1950.
Emily Green, Notary Public, State of New York;
No. 31-6638100, Qualified in New York County.
Certificate filed with N. Y. Co. Clerk and Register.
(Seal.)

Commission expires March 30, 1952.

[fol. 1076] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

AFFIDAVIT OF OSCAR KATZ—Filed Nov. 13, 1950

STATE OF NEW YORK,
County of New York, ss:

Oscar Katz, being duly sworn, deposes and says:

1. I am Director of Research of Columbia Broadcasting System, Inc. I make this affidavit in opposition to the claim of plaintiffs that unless the FCC order adopting standards for color television broadcasting is temporarily enjoined, RCA as manufacturer and RCA Victor Distributing Corporation as distributor, will suffer irreparable damage through loss of sales.

2. I have closely followed the effect of the FCC color television decision of October 10, 1950, on the retail sales of black-and-white television receivers in major markets throughout the country. At my direction, spot shopping surveys have been made; dealer and distributor reaction sampled; and a thorough distillation was made of major newspapers and television trade journals for data and facts.

3. The evidence thus obtained is analyzed in detail, with exhibits hereinafter. It may be summarized as follows:

[fol. 1077] (a) On September 18, 1950, a moderate credit control regulation (Regulation W, issued by the Federal Reserve Board) went into effect, covering television receivers, among other items, and requiring:

(1) a minimum down payment of 15%; and

(2) a maximum installment period of 18 months.

(b) On October 11, 1950, the FCC color television decision was announced, adopting standards for the field sequential system and thus authorizing the beginning of commercial color broadcasting on November 20, 1950.

(c) On October 16, 1950, the Federal Reserve Board tightened its credit control regulations (the coverage including television receivers) and thenceforth required:

(1) a minimum down payment of 25% (instead of 15%); and

...confusion believe that the color system developed by the Columbia Broadcasting System is good enough to put on the air—and that any TV station that wants to can transmit color pictures using CBS "standards" (technical specifications on how to send and receive color pictures). There is absolutely nothing in the decision to compel the broadcasters to transmit color television.

Q. What is the CBS method?

A. The Columbia Broadcasting System method of color television is a means of broadcasting color by transmitting each of the primary colors. To do this, they use a complicated optical device which picks up these primary colors—red, blue and green—in the camera, one after the other, as the transmitter can send them over the air. Then, to receive a color picture, there must be a rotating color filter wheel in front of your TV screen, synchronized so that the correct color filter is in front of the picture tube at exactly the right time. Thus, red, blue and green pictures appear on your screen fast enough to blend together, so that your eye sees them as a full color picture.

Q. Is the present CBS method final and permanent . . . or temporary?

A. Nobody knows for sure—it may well be temporary. The FCC's decision permitting the use of the CBS method does not stop other and better methods from being developed and eventually being put into common use by the entire industry. As a matter of fact, the FCC made this point very clear.

Q. Is the CBS color system the most advanced that can reasonably be expected?

A. While in the opinion of the FCC the CBS system gives the most faithful color pictures today, most electronic engineers feel that a better system will be developed. The RCA system, for instance, already has many advantages and recent developments indicate an early solution to the reasons why the FCC rejected it. The FCC has not shut the door to a new system. The CBS color system uses a mechanical color "scanner"—a rotating color disk. Back in 1927 regular, black and white television also used a rotating disk with holes punched in it. It is true they produced pictures but the pictures were far, far more poor by present day standards. The whirling disk with its disappointing picture was soon replaced by the present "all-electronic" television system with its fine, clear, steady pictures. One electronic expert has said **all-electronic color system will come fairly soon?**

A. Frankly, while we don't know for sure, we believe it will. It is certainly a possibility. CBS has made an important contribution to color television. But almost all electronic engineers believe that CBS color will be followed by an improved all-electronic system. Just as the old whirling disk was followed by the present all-electronic black-and-white system. An all-electronic system could, and certainly should, be compatible—meaning color pictures could be received in black-and-white on present television sets without an adapter.

Q. If the CBS method is temporary, why was it selected at this time?

A. Right or wrong, the FCC felt that some sort of color television should be started now, whether or not it proved to be the final method. In addition they felt that any delay in the adoption of a non-compatible system might result in the obsolescence of even more sets than the 8,000,000 now in use. After examining the color systems of CBS, RCA and Color Television, Inc., the FCC decided that the CBS system reproduced color more faithfully than the others in their present state of development. This, in the opinion of five of the seven members of the FCC, dissenting were Commissioners Sterling and Hennock, outweighed the fact that the other color systems gave pictures which, in the opinion of experts, had better detail and less flicker, were all-electronic and compatible—meaning color pictures could be received in black-and-white on present TV sets without an adapter.

Q. Who will telecast color pictures?

A. From present indications, it appears that only the Columbia Broadcasting System will transmit color pictures using the CBS method, at least for the time being. The other networks, NBC, ABC and Dumont, have not indicated that they intend to do any color telecasting using the CBS method.

Q. How soon will there be color telecasting in my area?

A. If you live in New York City, WCBS-TV (the only station in the United States now equipped to initiate color telecasts) expects to start 20 hours of color telecasting a week on November 20, 1950, probably at "off" hours, day time and late evenings. But even in New York, the top programs, including those of CBS, will undoubtedly be on black-and-white TV for several years. If you don't Your favorite programs will continue to be broadcast in black-and-white for a long time. Even CBS says that black-and-white TV and color TV will exist side by side for some time to come.

Q. Will I still be able to see the top shows—like Milton Berle, Bob Hope and Wayne King—on black-and-white TV on my regular set?

A. Yes, for at least several years. There won't be many color receivers for some time. And the CBS system is incompatible, it cannot be received by today's 8,000,000 TV receivers. Most advertisers cannot afford to pay for good shows that reach only a limited number of people—they must have large audiences for the greatest return on their investment.

Q. Will my present TV set be able to receive black-and-white pictures from color programs if CBS starts telecasting them in my city?

A. No. The CBS system is not compatible—which means that its color pictures can not be received on existing sets as a black-and-white picture.

Q. How can existing sets be changed to pick up color broadcasts in black-and-white?

A. By adding an "adapter" to the set, providing the set manufacturer makes such an adapter available. The adapter, which contains tubes, condensers and resistors, will come in a little box which may be wired to the set. It will, according to most manufacturers, cost probably $60 to $100, and perhaps $10 to $15 for a serviceman to install.

Q. How good will black-and-white pictures be from a CBS color telecast?

A. Frankly, not so hot. They will have only about ½ the detail of the regular black-and-white pictures. That's because the CBS color system adopted by the FCC has basic limitations that result in less efficient use of the channel space than that of the black-and-white system.

Q. Can my present TV set be "converted" to receive CBS color and what will it cost?

A. Yes, in many cases it can—if the manufacturer of your set provides a complete color converter which includes an adapter and a mechanical filter wheel. However, you won't be able to get color pictures any larger than 12½ inches for **have I any assurance that this will be the final color system?**

A. No. The CBS whirling disk in front of your screen may be replaced in a few years or maybe sooner by a more efficient all-electronic and possibly compatible system.

Q. Is there a color method being developed that is compatible—meaning I could receive color telecasts in black-and-white without any changes in my set?

A. Yes, several methods are in process of development that would do just that. They're called "all-electronic"—require no mechanical filter wheels, are not limited by picture size, and are compatible to present black-and-white standards. I.e., you could receive color telecasts in black-and-white with *no* adapter necessary. Two of these methods use special "Tri-color Tubes" and appear to offer several advantages. Both eliminate the bulky rotating wheel now necessary in a CBS converter. You can get a larger color picture—16 inches or more. Certain problems such as limited brightness, flicker and rainbow-hued edges of moving objects, all inherent to the CBS system, are corrected in these systems. One system, RCA's, is now said to be in the state of engineering finalization. It still, however, has to be tested and approved by the FCC, who previously rejected it on the basis of lack of faithful reproduction of colors.

Q. If I bought a color set using the CBS mechanical method—and if later one of the "all-electronic" methods were adopted by the FCC as a standard—would that color set become obsolete?

A. That portion of the color set that brings you the pictures in color might become obsolete. However, the other portion of the set—that which produces black-and-white pictures (since the present standards—would continue to serve you, and would even get the all-electronic color programs in black and white.

Q. Are today's TV sets about to become useless and obsolete?

A. Heavens, no! Black and white pictures will continue to be predominant for years and years! Advertisers now reaching an audience of many millions daily (and the figure is leaping every month) will not spend their money on expensive color programs for the public's enjoyment until there is a big enough audience to see and hear their message.

(1) We will continue to make TV sets that give you excellent black-and-white pictures. These sets, however, will be provided in the near future with a plug connection for an adapter or converter.

(2) We have the design of an adapter in process, which can be connected to these sets simply by plugging in. It should be in production during the first half of next year.

(3) For Raytheon sets manufactured since Jan. 1, 1950, we will have a "field kit" containing connection plug and other necessary parts, which your Raytheon serviceman can install on your set for a small fee.

(4) We will market a color converter as soon as the programming and public acceptance of color makes such a course feasible.

(5) When and if the public demands it, Raytheon will produce a full-color set.

We choose this policy because it eliminates any possibility of obsolescence of Raytheon sets now in use, and it assures complete adaptability of any future Raytheon sets to existing conditions.

Since you, the consumer, will have to live for probably 25 to 30 years with the standards that are finally adopted by the Federal Communications Commission, we insist that the best possible color standards be adopted. We do not believe that the present CBS method is the final answer.

★ ★ ★

Those are the facts as most television experts see them. We hope they will help you make up your mind on what to do about the color TV problem.

Actually, it boils down to this. If you want to enjoy top-flight television programs in black-and-white for the next year or two, buy your TV set now. If you want to enjoy good TV programs now, and want color later, buy a set that can be easily adapted to color. If you want the final, permanent color system—wait several years before you buy. By then, the chances are there will be an all-electronic color TV system—one that may be compatible—that will satisfy everyone, and you in particular.

If we can be of further help to you, please drop us a line. We'll try to answer your questions. And won't you please help us by filling out the simple questionnaire printed below and mailing it to us? Thanks!

60-Second Questionnaire—Fill Out and Mail Today

PLEASE TELL US WHAT YOU THINK—

Like every manufacturer, we at the Raytheon Manufacturing Company want to make what you, our valued customers, want. Our job is to serve you. After reading the facts on this page, we would greatly appreciate your answering the few simple questions below. Just write your answers in soft pencil, tear out this form and mail it to us.

IF YOU OWN A TV SET ANSWER THESE QUESTIONS:

1. In general, how do you feel about color TV?
☐ Enthusiastic ☐ Can take it or leave it ☐ Don't want it

2. Would you install an adapter costing maybe up to $60.00 as soon as possible to get color pictures in black-and-white?
☐ Yes ☐ No

3. Do you plan to install an adapter and a converter costing maybe up to $300.00 in your set as soon as possible to get full-color pictures?
☐ Yes ☐ No

4. Concerning the set you buy, will you
☐ Buy a regular TV set without regard to color?
☐ Buy a regular TV set as soon as it can be easily adapted to get color?
☐ Wait several years until color is perfected and standardized?

IF YOU DON'T OWN A TV SET ANSWER THESE QUESTIONS:

1. In general, how do you feel about color TV?
☐ Enthusiastic ☐ Can take it or leave it ☐ Don't want it

2. Concerning the new TV set you may buy, will you
☐ Buy a regular TV set now without regard to color?
☐ Buy a regular TV set as soon as it can be easily converted to get color?
☐ Wait several years until color is perfected and standardized?

FOR OWNERS AND NON-OWNERS

1. Please make any comment you wish to.

Please fill in your name and address, unless you prefer not to:

NAME _____
STREET _____
CITY _____ ZONE _____ STATE _____

Thank you for your help

Mail to: RAYTHEON, Public Service Division
8921 West Dickens Avenue, Chicago 39, Illinois

A word about RAYTHEON

For twenty-five years, Raytheon has pioneered and led in radio, tubes, radar, television. It has manufactured billions of dollars worth of intricate electronic devices. All Raytheon sets now carry the valued Good Housekeeping Guaranty Seal.

BELMONT RADIO CORPORATION, 8921 West Dickens Avenue, Chicago 39, Illinois
Subsidiary of Raytheon Manufacturing Company

Dependably Built for Dependable Performance

RAYTHEON TELEVISION

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250 Fourth Avenue, New York — Phone: AL 4-2200

FOR NAME AND ADDRESS OF YOUR LOCAL RAYTHEON DEALER, PHONE OR WRITE US

Distributors of other well-known appliances, such as:

Thor Home Laundry Equipment • Universal Vacuum Cleaners
Kelvinator Electric Water Coolers and Air-Dryers
General Electric Appliances • Toastmaster Products

(2) a maximum installment period of 15 months (instead of 18 months).

(d) There was *some* decrease in TV receiver sales in *some* cities and markets for a period of about 10 days following October 16. It varied greatly. In no market was it uniform. It clearly appears to have been a small, temporary, sporadic decline in sales followed by recoveries, with a new decline indicated after November 1 when the excise tax on television receivers went into effect.

(e) There were important factors, wholly independent of color, which tended to have an adverse effect on sales. These include the credit restrictions, a new excise tax (effective November 1), and other factors. Hence it is impossible to attribute the decline in sales, to the extent that there has been any, to the FCC color action.

(f) *Conclusion:* The FCC color decision had no appreciable effect on sales except at most for a few days of public confusion as to its meaning and effect.

[fol. 1078] Therefore, it appears that any possible adverse effect of the FCC decisions has already been fully discounted and it is highly unlikely that any dip in sales will recur upon and after November 20th which could be ascribed to the fact that the order then goes into effect pursuant to the decision. It should be emphasized, as noted in the affidavit of Frank Stanton, that CBS will in any event broadcast color programs on and after November 20th under its experimental authority if it should be unable to do so under commercial authority. Hence, the only difference will be that the broadcasts cannot be sponsored—a fact which would seem to be irrelevant so far as set sales are concerned.

4. In order to ascertain the exact effect of the FCC color decision on dealers' sales, CBS arranged for consultation with representatives of six leading retail chains and department stores and dealers in the New York City area. Each was asked the effect of the decision on its sales, and was asked whether it would agree to sign an affidavit setting forth the facts.

Without exception, each of these retail outlets refused to execute an affidavit, on the grounds that its maintenance of good business relationships with plaintiff RCA in this action precluded its furnishing such an affidavit. In view of the dependence of television retail stores and dealers upon

the major television manufacturers for their supply, this reluctance to jeopardize a long-standing and delicate business relationship is understandable, particularly since the affidavits requested are purely tangential to these dealers' interests.

This fact is cited only to explain why primary evidence of dealer reaction is unavailable.

[fol. 1079] Secondary evidence has accordingly been obtained. It is in two forms: (a) dealer interviews by research organizations; and (b) excerpts from news-stories appearing in the major newspapers and television trade-journals. These include direct quotations from a number of television manufacturers, distributors and dealers.

It is noteworthy that some of the secondary evidence thus obtained stems from the same dealers who declined to execute affidavits.

5. A careful survey was taken by McCann-Erickson, a research organization, of dealer reaction in the Los Angeles and San Francisco areas during the week of October 16-21. These areas may be taken as typical markets where there was a marked change in sales during this period.

One hundred and fifty dealers were interviewed in Los Angeles; 100 in San Francisco. The pertinent results tabulate as follows:

A. *Trend of Television Set Sales*

	LA	*SF*
Better than a month ago	16%	34%
About the same as a month ago	25%	37%
Not as good as a month ago	58%	27%
Don't know	1%	2%

Thus in San Francisco, 71% of all dealers interviewed reported sales at least as good as, or better than, the prior month (i.e., before the FCC decision adopting color standards); only one in four stated they had fallen off. In Los Angeles, 41% reported sales as good as, or better than, last month; but 58% felt they had declined.

Of all those reporting declines, nearly all agreed that the decline occurred between October 16 and 21, 1950—a week, [fol. 1080] it is to be noted, which immediately followed the Federal Reserve Board's credit restriction action.

B. *Reasons for Declining Sales Trend.* Those dealers who reported a decline—the 58% in Los Angeles and the

27% in San Francisco—were then asked what factors, in their judgement, caused such declines.

A majority of the dealers ascribed the decline to "Credit controls, too much down payment," "Confusion about color" ran second. The tabulated results:

	LA	*SF*
Total with declining sales	58%	27%
Reasons:		
1. Credit controls, too much down	36%	14%
2. Confusion about color	24%	12%
3. Rising prices	6%	
4. General unrest	4%	1%
5. Scarcity of merchandise	2%	5%

C. *Future Effect of FCC Color Announcement on Sales.* In response to the question concerning what the *future* effect of the FCC color decision would be on their sales, the dealers were of the following opinion:

	LA	*SF*
Sales will suffer	65%	43%
Sales will not be affected	26%	47%
Don't know	9%	10%

This estimate of the future, made during the week of October 16-21, is particularly interesting in view of the almost total recovery, or even rising trend of sales nationwide, that has occurred in the week since the survey was [fol. 1081] made. *Retailing Daily*, November 1, 1950 (p. 34).

The fears reflected above were apparently part of a general confusion in the minds of the industry as well as in the public, and have not been borne out.

D. *Have Sales Been Affected Yet By the Color Announcement?* At this specific question, the replies became inconsistent; it would appear that the exact effect was as yet unclear to the dealers as a group:

	LA	*SF*
Sales already affected	49%	31%
Sales not affected	51%	69%

It is to be noted that by the week of October 31, 1950, sales volume in Los Angeles and San Francisco was re-

ported returned to "normal" or "above normal". *Retailing Daily*, November 1, 1950 (p. 34). Said one retail outlet on October 31: "Business is going like blazes." Another told the trade journal: ". . . the color question seems to have dropped into the background."

6. The Los Angeles and San Francisco sales' reaction has been submitted as the one probably most marked in trend.

Other retail markets, in other parts of the country, showed far less reaction.

For example:

On October 13, 1950, the New York Herald Tribune, in its business column entitled "Buyers and Sellers", reported:

> "Crowds thronged the television departments and bought heavily (on October 12, Columbus Day). The fact that color television has been approved and that commercial telecasts are to start November 20 apparently is having no adverse effect on the sale of black and white receivers."

[fol. 1082] Note particularly that this sales' strength appeared between the date of the FCC color announcement—October 10—and the announcement of the new rigorous credit controls on October 16. This emphatically supports the conclusion that any decline subsequent to October 16 should be primarily ascribed to the requirements of the new amendment to the Federal Reserve Board's Regulation W.

The October 14th issue of *Television Digest* reported (p. 8):

> "Except for cancellation of small orders by some dealers, and to lesser extent by a few purchasers, there has been no great upset in today's flourishing market.
>
> • • •
>
> "Quick survey of key Washington (D. C.) distributors and dealers reveals there's not much public reaction, few cancellations. Two of city's largest chains sold more TV's Thursday (day after color report) than day before. Only negative reaction was from George Wasserman, owner of George's, one of coun-

try's biggest chains. Wasserman is worried about inventory, said he was going to cancel all orders Nov. 1, won't re-order until manufacturers assure him he won't be left holding the bag if sales drop. * * *

"* * * But business is good, he admitted, and he thought it will be years before manufacturers have color sets at any reasonable price level."'

Retailing Daily, (Oct. 17th issue), reported as follows (p. 1):

"Declines were noted in *Philadelphia*, *Los Angeles* and *Chicago*, but the number of actual cancellations by customers was small."

"*Atlanta, Oct. 16*—With few exceptions, key retailers here have lost no sales because of the FCC ruling on color television.

Newark, N. J. "had little or no effect" from the decision by October 16th. (p. 42)

Seattle, Wash. suffered "a barely perceptible slackening off in retail sales," but no cancellation of orders were received, and "television sets are in short supply, and coming through in a trickle and dealers' stocks are at low levels due to recent unprecedented volume of sales." (p. 42)

New Orleans had no consumer reaction so far from the FCC color decision. Major dealers anticipated that there would be a "falling off in sales this week in reaction to the more stringent credit controls." (p. 42)

[fol. 1083] *Boston* reported to *Retailing Daily* (October 14, 1950) that "good sales continue," with "virtually no effect on sales" from the FCC decision; and by the week ending October 31, 1950 (*Retailing Daily*, November 1, 1950), the volume had even increased, in some cases, to "phenomenal".

In *Cleveland*, there was apparently a decline of sales, but the reasons given were mixed. *Retailing Daily*, October 19, 1950, reports (p. 34) that a survey among retail stores revealed the FCC color decision had a "marked effect". But while "most stores said that business had not been as brisk as before the color announcement, one buyer whose business has declined in the past week or so has offered the opinion that this decrease may not be entirely

due to the FCC decision. * * * Cancellation of orders from distributors are negligible."

Retailing Daily headlined its October 17, 1950 issue as follows: "Most Retail TV Selling Holds Up Satisfactorily." Its survey concluded that the FCC color decision "has had less effect on retail sales than was expected, judging by early reports from key markets throughout the country."

New York, the nation's largest TV market, was surveyed again by *Radio Daily* (*Television Daily*) in its October 30, 1950 issue (p. 8):

> "TV receiver sales in the New York Metropolitan area continued to hold their record high pace despite the general confusion and anxiety created by the color controversy, a *Radio Daily* survey revealed. Majority of retailers polled reported set sales as 'holding up.'"

7. Clear evidence appears from the newspaper and trade journal reports that even the slight declines felt in some cities were, at most, temporary conditions.

In *Chicago*, Vahey Television Sales, Inc., told the *Wall Street Journal* (issue of October 28, 1950):

> [fol. 1084] "This is the first good week we've had since credit restrictions went into effect. Weekly sales have been running about 15% below 'normal'. This week we're about 15% ahead."

The *Wall Street Journal*, in the same article, noted:

> "The pick-up isn't affecting some stores, particularly those that used to give easier credit than is now allowed (under the amended Regulation W)."

The *New York Post* Television Section of October 29, 1950 headlined its report: "The Calamity Is Over. Business Is Booming." Its article stated:

> "There is no secret in the trade that The Calamity (the New York Post's epithet for the FCC decision) caused widespread havoc. Some retailers reported that the 48 hours following the unfortunate (sic) announcement by the FCC there wasn't a single TV set moved. Beginning early this past week, however, sales

began to pick up. By the middle of the week nearly all retailers reported that sales were 'normal.'"

On November 1, 1950, the *New York Daily Mirror* stated:

"Sales of television receivers were reported better than ever yesterday by leading dealers in the New York area. * * *

"A. Davega, vice president of Davega Stores, Inc., told the Mirror that customers were not frightened away by the clamor over the color ruling. Most persons, he said, seemed to feel that the entertainment they get in black and white today is good enough to warrant purchasing a set and they know that sets now in use can be converted to receive CBS-color-cast—if, and when. 'Our October 14 sales', Davega said, 'were twice the volume of the Saturday previous to the ruling.'"

* * * *

"Henry Broido, merchandising manager for Gimbel's, revealed the color announcement caused a temporary lull in sales which lasted a few days, but sales are 25 to 30% better now than in weeks prior to the ruling."

* * * *

"A spokesman for Ludwig Baumann told a similar story of a lag in sales immediately after the color decision, then a brisk comeback which brought record business since the beginning of last weekend."

In *St. Louis, Retailing Daily* (October 18, 1950) reported that customers had a two-day "wait-and-see" reaction, but [fol. 1085] "This reaction was only temporary, most sources reported. Sales began to pick up at the end of the week, although they are well below '30 or 60 days ago', buyers observe." By October 31st (reported *Retailing Daily*, November 1, 1950), "sales are back to the high levels prevailing before October 16, when stricter credit curbs went into effect."

In *Detroit*, "business is holding up remarkably well" and "There has been no appreciable drop in TV sales," reports the same journal on October 18, 1950.

In *Radio & Television Weekly* (October 25, 1950), the trade journal reports, at p. 13:

> "Los Angeles Trade Not Too Perturbed Over Color 'Mixup'—Distributors Say It Is Only 'Nine Days' Scare'—Business Expected to Continue Good."

In New York, the *Radio Daily* (*Television Daily*) (October 23, 1950) headlined its issue:

> "TV Receivers Selling Despite Color Dispute."
>
> "The great majority of retailers polled (in a *Radio Daily* survey in New York) reported set sales as 'holding up'. A few disclosed receiving some cancellations over the week-end when the color story first broke. But they insist that the loss is negligible and new orders continue to come in."

In *Radio and Television Weekly* (November 8, p. 1), a headline stated "Effects of Color TV Dispute No Longer Deterrent to Sales." The article reported in part:

> "The adverse effect upon television set sales resulting from the recent Federal Communications Commission decision on color TV are to a large extent a thing of the past, a survey of dealers throughout the country during the past week indicated."

Most significant, and indeed clear evidence pointing to the fact that the plaintiffs in this action have not suffered damage, is the statement of RCA's own New York City distributor, Bruno, Inc., reported in *Radio Daily* (*Television Daily*), issue of October 23, 1950 (see photostatic copy, Exhibit A):

> [fol. 1086] "A spokesman for Bruno, Inc., the RCA distributor in New York, reported business is extremely good. Only one dealer cancellation was received due to the color mixup, he said, but this was more than nullified by the numerous requests from other dealers for deliveries to fill their needs."

The same RCA distributor was quoted directly in the trade journal *Variety*, issue of October 18, 1950:

> "According to an exec. of Bruno-N. Y. which distributes RCA products,

"'We haven't felt any impact from color at all and can still ship out every piece of TV equipment we can lay our hands on'' (see photostat, Exhibit B).

And in *Television Digest* (October 14, 1950, p. 8), it is reported that:

"A major eastern RCA distributor says dealers are 'mildly upset' but haven't cancelled or refused deliveries; another big one told of 11 dealers cancelling small orders."

8. While plaintiff RCA has made no public statement concerning its sales following the FCC color action, other manufacturers have explicitly denied any adverse effect; because of the very substantial popularity of RCA receivers (see paragraph 9 below), it is reasonable to assume that if other manufacturers have not been affected, RCA has not. Thus, Motorola, a major manufacturer, speaking through Walter Stellner, advised the trade journal *Television Digest* (issue of October 14, 1950 (p. 7)) that his company has no color plans at the moment, and said that dealers were still taking all sets turned out and merely joking about "sending us truckloads of color sets." Motorola is reported in the same publication to have wired its distributors and dealers:

"We feel there is nothing alarming about this decision because it does not affect today's black-and-white TV. * * *

"* * * The public has been hearing about color for almost 2 years but they have gone on buying present black-and-white sets in huge quantities. We are convinced they will continue to do so."

[fol. 1087] The same trade journal, issue of October 14, 1950, reported that the following manufacturers were queried, and, despite avowed opposition to the FCC ruling, each commented that the color decision had not had any effect on sales:

Kaye-Halbert, from Los Angeles:
"has felt no impact on sales due to FCC decision." (p. 6)

General Electric:

"Distributors report considerable confusion and public questions but no definite reports on effect on sales." (p. 6)

Hallicrafters:

"* * * Some jobbers report their dealers are restive, but others ask us to divert to them any receivers which may be cancelled by others." (p. 7)

Olympic:

"has had no adverse reaction from dealers yet." (p. 7)

Sylvania:

"There is no evidence yet of adverse impact on trade." (p. 7)

Tele-King:

"Too early to feel results from distributors and dealers on sales." (p. 7)

Emerson:

"Decision had some effect on dealer sales but not sufficient to affect company's production until end of year." (p. 6)

Belmont Radio (Raytheon):

"Impact of decision on dealers and distributors has resulted in isolated cases of color hysteria. However, these reactions are in no way indicative of the actual effect on the market." (p. 5)

Bendix:

"Because of the huge mobilization program, mass production of color TV receivers is at least 3 to 4 years away. * * * The immediate problem is meeting the demand for black and white." (p. 5)

Only Hoffman Radio, of the manufacturers reporting to *Television Digest* (October 14, 1950), specifically stated that [fol. 1088] the FCC action adversely affected its sales. That company reported that "the FCC color decision pulled rug from under TV sales at both wholesale and retail, and manner in which news release has been handled by CBS and FCC has augmented confusion in present set owners minds as well as potential buyers" (*Television Digest*, October 14, 1950). It should be noted that the reason given for the alleged adverse effect on sales is not the *practical* effect of the FCC color decision, i.e., the commencement of commercial color telecasting on the CBS standards on November 20th, but the "confusion" in the mind of the

public which was engendered by the "manner" in which the news releases on color were handled.

Zenith was quoted in the New York Times issue of October 13, 1950 as declaring it had no intention of "halting or slowing" the manufacture of black-and-white sets.

During the week of October 23, the Radio-Television Manufacturers Association was quoted in the *Radio Daily (Television Daily)*, issue of October 27, 1950:

> "Officials of the RTMA said so far no manufacturers have reported slumps or increases in set sales due to the color TV decision."

And one manufacturer, a few weeks later, found the color decision a three-day curiosity, no more. Frank A. D. Andrea, president of *Andrea Radio Corporation*, in an interview given to the *New York Times* (issue of November 5, 1950), discussed the question thus:

> "Mr. Andrea also reported that the slump in dealer orders following the Federal Communications Commission approval of Columbia Broadcasting System's color television system had completely receded so far as his company was concerned. The approval was given on October 11, and for the following three days dealer orders fell 80 per cent, he reported. On the fourth day after the FCC decision, orders picked up, and at the end of last week the company was selling all its production."

[fol. 1089] The foregoing newspaper or trade journal reports concerning the statements of manufacturers are expressly confirmed by the affidavit of Earl W. Muntz, vice-president of Muntz TV Inc., a manufacturer of television sets. That affidavit discloses that sales *increased* following the FCC color action.

9. As already noted in the preceding section, RCA distributors themselves have publicly stated that their business was unaffected by the FCC color action. This is confirmed by the shortage of RCA television receivers in television stores.

The Chicago area was, at my direction, canvassed on October 26 and 27, 1950 to determine the availability for sale of RCA television receivers. A shopper survey (see affidavit of Grace Olsen, Exhibit C attached hereto) covered

ten television retail outlets, including such major stores as Carson, Pirie, Scott & Co.; Marshall, Field & Co.; Goldblatt's; and Hudson-Ross. It showed that stocks of RCA television receivers were extremely low; that some major retail stores were entirely out of stock on RCA receivers, with delivery "estimated", depending on model, at 3 to 10 weeks; that others had in stock only a few RCA receivers, with deliveries in some models in some cases promised for "three months"; that the average number of RCA sets held in stock by the ten outlets was four; and that the largest number in any of the stores shopped was eight.

The shopper was told that "whatever models are shipped move almost immediately."

The same shortage of current RCA receiver stocks which was found in Chicago was also found to exist in New York City. The shopper (see attached affidavit of Sydonia Stanislaw, Exhibit D) tried Macy's Liberty, Davega (two stores), Dynamic, Rabson's, Bloomingdale's, Gimbel's, [fol. 1090] Wanamaker's and other stores for RCA receivers. Five—Macy's, Liberty, Davega, Rabson's and Bloomingdale's—had none in stock and were taking no orders for them. All agreed that RCA sets were in very short supply, and that deliveries were slow and uncertain. The remaining stores shopped had a few models in stock. The average number of RCA sets in stock, for the eighteen stores surveyed, was four, and these were not in the most popular table models.

The plaintiffs RCA and RCA Victor Distributing Corporation have alleged that future sales of their inventory of black-and-white receivers will be jeopardized unless a preliminary injunction issues forthwith against the FCC order authorizing commencement of commercial color telecasts under the FCC-established standards. The short supply of RCA sets indicated by these surveys points in exactly the opposite direction.

10. Some retailers not only suffered no decline in television sales as a result of the FCC action but, on the contrary, took advantage of the action to *increase* sales by constructive steps.

For example, Dynamic Stores, a chain of retail stores in New York City, ran a full-page newspaper advertisement in the major metropolitan papers on Wednesday, October 25, 1950 (see photostat attached, Exhibit E). The

result, reported the trade journal *Retailing Daily* on October 27, 1950, was:

> "Excellent response, both in inquiries and sales of sets, resulted from Dynamic Stores' Wednesday ads in New York papers guaranteeing conversion to color for '$49.50 or less'.
>
> "Jack Winer, head of the TV and applianee chain, said the effects were felt in all the firm's metropolitan stores and that home demo calls jammed the wires at the main stores all day. Sales, he said, were triple that of an average day's, and inquiries came in from dealers and distributors all over the country."

[fol. 1091] Similar newspaper advertisements were run by Davega Stores, Inc., another chain of retail stores in New York City (Exhibit F). These advertisements offered a "color guarantee", guaranteeing that the purchaser of a black-and-white set could later have his set adapted and converted by Davega. These advertisements were first run on October 27, 1950. A. Davega, vice-president of Davega Stores, Inc., reported that on October 28, 1950, the day following the advertisements, "sales were 250% of our unit volume on the same day in 1949" (*New York Daily Mirror*, November 1, 1950).

11. In any event, a number of factors completely unrelated to color have had an adverse effect on television receiver sales.

William J. Cheyney, executive director of the Retail Credit Institute, at a store conference of the National Association of Music Merchants, held in New York from October 16 to 20; was reported by *Radio & Television Weekly* (October 25, 1950, p. 19), to have advised the conference that installment purchases in all appliances, television sets included, had dropped substantially since Regulation W was imposed on September 18th and that the latest tightening of controls (October 16th) would result in a further drop and probably cut into the Christmas trade. Referring to the 25%-15 months credit control terms, he said:

> "'To one who understands the market, this action blots out completely 100% the purchasing of these "listed" durable goods for a broad segment of the American people, most of them farmers or workers.'"

Television Digest, October 28, 1950 (p. 8), remarks:

> *"Credit Controls Hit TV Hardest"*—"Tighter Regulation W (now 25% down and 15 months to pay) is having a much *worse effect on TV sales* than talk about color, according to best available sources. It's estimated some 70% of TV set sales are on time-payment."

[fol. 1092] "In Hollywood, Cal.," states the *Wall Street Journal* (October 28), "Bernard Weiss of Jerry's Market thinks credit controls are the real culprit in his 50% drop in volume in the last fortnight. 'The average working Joe doesn't have the dough to meet the new terms.' "

In *Retailing Daily*, October 18, 1950 (p. 41), appeared the following:

> *"Credit Rules Big Worry to Cincinnati Retailers"*
> "There is no question that the color television edict announced by the FCC has caused a flurry in retail stores here, but a rapid spot check of a cross section of the dealers here indicates that these men are more worried about the possible effects the more stringent credit controls are going to have. * * *"

The article then quotes two department stores to the same effect.

And in *Retailing Daily*, October 25, 1950 (p. 31), datelined Chicago:

> "Nearly all stores checked report sales 5 to 10 percent under the week before. * * * Opinion is divided among local retailers as to whether the color controversy or the 25 percent down payment has had the greater adverse effect on sales. Effect of the stricter credit terms can be measured more immediately, since nearly all stores have seen customers walk out when told that the $60 which they thought would be sufficient for the down payment on a $400 set would have to be upped to $100."

The direct effect of Regulation W's tightened credit controls can readily be illustrated by reference to a study, made this year by Cunningham & Walsh, Inc., a well-known advertising agency, entitled "Videotown III 1950."

On page 14 of that study, statistics are given which show that in an average, actual American community of 40,000 population in the New York area, more than 50% of 1950 television receiver retail sales were financed on the installment plan; and that the trend of buying TV sets has shifted from the upper brackets to the middle and lower income brackets.

[fol. 1093] Accordingly, the "25% down, only 15 months to pay" provisions of Regulation W will hit the largest consumer market the hardest.

These data were further corroborated by Mr. Homer Jones, Federal Reserve Board, Washington, D. C. Mr. Jones stated on November 3, 1950, that upon the basis of field surveys made by that agency for publication in their "Bulletin", it was estimated that about 45% of all television set sales are financed, and the great bulk of these were made at easier terms than the new Regulation W permits. Mr. Jones estimated that of the possible 45% of television set sales financed, perhaps 40% was done on more lenient terms; in other words, possibly 80% of all financing was done at the easier credit terms.

The *Federal Reserve Bulletin* of July, 1950, commenting on the rising market for television set sales over 1949 volume, said (p. 14):

> "A larger proportion of consumers at each income level expected to buy sets this year than last, with the lower income groups showing the larger increases."

A second adverse factor is the 10% excise tax which went into effect on television receivers on November 1, 1950.

In Louisville, Ky., reported *Retailing Daily* on October 31 (p. 31):

> "Television set dealers are getting good response to the rash of ads urging consumers to buy sets before the November 1 tax deadline.
>
> "The dispute on color television has not affected volume at all, dealers reported."

Dr. Allen B. DuMont, head of the Laboratories which manufacture and develop television receivers, in a speech on October 30, 1950, to a meeting of the fall convention

of the RTMA, held in Syracuse, is reported by *Daily Retailing*, issue of October 31, 1950 (p. 31) as follows:

[fol. 1094] "To date, the repercussions on set sales from the FCC decision have not been too severe, Dr. DuMont said. 'On Wednesday the new 10 per cent excise tax becomes effective, and then we will see what the cumulative effect of these many Government-imposed problems has been on our market,' he said. 'We'll find out if the color controversy, the new credit restrictions, the excise tax, increased income taxes and finally the "freeze" on new stations have pushed the would-be buyer out of the market.'"

The *Radio Daily* (*Television Daily*) November 1, 1950 headline read as follows:

"Rush to Buy TV sets to Avoid 10% excise tax
Dealers Report Heavy Demand Past Week

"Heavy sales of TV receivers in the sixty-three cities served by television stations was reported the past few days as both dealers and consumers sought to avoid payment of the 10% manufacturers' excise tax which becomes effective today, *Radio Daily* learned yesterday. During the past few weeks dealers in such key center cities as New York, Chicago, Philadelphia, Boston and Los Angeles have been stocking up on black and white receivers anticipating the excise tax. Manufacturers reported an unprecedented demand for 16-inch table models and larger sized console models."

The fear of adverse effect of the excise tax was substantiated subsequent to November 1, when the tax went into effect. *Retailing Daily* reported on November 8, 1950, a comprehensive and detailed survey concerning the effect of the tax. Its headline (p. 1) was "First Week of TV Excise Tax Brings Sharp Drop In Sales." It reported:

"With few exceptions, TV market areas yesterday reported a serious drop-off in sales the the first week since the 10 per cent excise tax went into effect. Sales in some sections plummeted to a record low, according to a countrywide Retailing Daily survey."

In a special article concerning sales in Chicago, the same issue of *Retailing Daily* reported (p. 41):

"Chicago TV Sales Drop Sharply as New Excise Takes Effect
All Retailers Hit Hard By Decline Even Though Still Promoting Tax-Free Floor Stock

[fol. 1095] "After skyrocketing to new heights during the last five or six days before the excise tax went into effect, retail television sales in the Chicago area have plummeted back to earth since Nov. 1."

* * * * *

"For the most part the stores are not worried by their weighty inventories and will continue to accept shipment, although on a more selective basis. They expected that the combination of credit controls, color talk and the excise tax would result in a slow period for at least the first two weeks of this month, and are equally confident that volume will work up again as the public becomes accustomed to the new conditions."

Other factors have also been suggested as operating adversely to receiver sales. For example, in *Radio & Television Weekly*, October 25, an article entitled "This Is Chicago" (p. 16) states:

"Meanwhile, manufacturing and retail sources here said that there has been a definite slowing down of buying by consumers, and consequent lessening of pressure on factories. This was ascribed to a possible combination of public confusion over the FCC order, the recently-imposed federal credit restrictions and the easing of fear over cutbacks in set manufacture as a result of better war news from Korea."

And in *Retailing Daily*, November 7 (p. 36), it is reported:

"The color controversy has had less effect on the television market in recent weeks than other factors affecting the business, according to W. A. Blees, vice-president of Avco Manufacturing Corp., and general sales manager of the firm's Crosley division (which manufactures television receivers).

"Among the factors which have had move bearing on television sales than color, he mentioned credit controls, panic buying in July and August which robbed the fall market, and the fact that thousands of young men have been in a state of uncertainty regarding their future military service status. Besides, he said, the industry's selling organizations have gone soft at all levels."

12. In order to obtain data additional to the foregoing relating to the effect of the FCC color action and other factors on television set sales, I caused a survey to be made [fol. 1096] by the Business Information Division of Dun & Bradstreet, Inc. The survey was conducted by that organization on November 7-9, 1950, in order to obtain the most recent possible information. Dun & Bradstreet interviewed 675 television set retailers and 75 wholesalers in those cities throughout the country where there are television stations. The resulting report, entitled "A Survey of Business Conditions Among Major Brand Retailers and Wholesalers of Television Receivers," is set out in full as Exhibit G, attached hereto. Its principal findings may be summarized as follows:

a. A majority of retailers (59.2%) and of wholesalers (62.5%) reported that television set dollar sales were *higher* in October than in September, while only 24.4% of the retailers and 12.5% of the wholesalers reported such sales were lower. 16.4% of the retailers and 25% of the wholesalers reported that the sales were the same for both months.

b. Of the minority of the retailers who reported sales *lower* in October than in September, most (50.6%) assigned the credit restriction as the major reason for the decline. Only 37 of the 156 retailers who reported declines in October gave color television as the first reason, and only one of the eight wholesalers who reported declines similarly found color at fault.

c. Only about one-fifth of the interviewees reported that October sales were below their expectations; even among this one-fifth, however, Regulation W was more frequently assigned as the reason for the disappointment than was color television.

d. In response to the question concerning sales in November, 2.2% of the retailers and 21.9% of the [fol. 1097] wholesalers reported "excellent"; 14.9% of the retailers and 26% of the wholesalers reported "good"; 34.9% of the retailers and 26.6% of the wholesalers reported "fair"; and 47.2% of the retailers and 17.2% of the wholesalers reported "poor."

e. Among the retailers who reported November business as only fair or poor, the majority blamed the excise tax; about one-third ascribed the condition to Regulation W; and less than one-fifth found color television at fault.

f. The majority of retailers (53.5%) and wholesalers (60.9%) reported no abnormal cancellations during the two weeks prior to the interviews. The information that there had been no cancellations at all was volunteered by about one-fifth of the interviewees. Only 7.2% of the retailers and 6.3% of the wholesalers stated that cancellations were abnormally high; in fact, a greater number reported them abnormally *low*.

g. Among the handful of retailers who thus reported high cancellations, Regulation W was given as the reason more frequently (15 times) than color (14 times). Only one wholesaler ascribed high cancellations to color.

h. In response to the question whether shortage of sets, color, Regulation W and the excise tax were unfavorably affecting sales, 37.8% of the retailers gave the excise tax as the prime adverse affect, 33.9% gave Regulation W as the prime reason, and only 15.3% gave color as the prime reason. Among wholesalers, the prime adverse affect was thought to be Regulation W (43.3%), excise tax (33.3%), shortage of sets (16.7%), and color (only 6.7%) in the order named.

[fol. 1098] The Dun & Bradstreet survey, therefore, fully confirms that there has been no universal, or even general, decline in sales since the color television decision and that, where there has been thought to be a decline, or even a disappointment in expectations, factors other than color television were most frequently assigned. In these circumstances, it would seem to be clear that the mere fact that the FCC order permitting commercial color broadcasts on and after November 20 becomes effective on that

date cannot be said to threaten immediate and irreparable injury in plaintiffs' set sales either at the manufacturing, wholesale or retail level.

Oscar Katz.

Sworn to before me this 10 day of November, 1950. Emily M. Green, Notary Public, State of New York, No. 31-6638100, Qualified in New York County, Certs. filed with N. Y. Co. Clk. & Reg., Commission Expires March 30, 1952. [Seal]

(Here follow 2 Photolithographs, side folios 1099, 1100)

EXHIBIT A

-728A-

Bruno Statement
Radio Daily (Television Daily), October 23, 1950

RADIO DAILY
TELEVISION DAILY

VOL. 53, NO. 15 — NEW YORK, MONDAY, OCTOBER 23, 1950 — TEN CENTS

O'NEIL INTERESTS TOP DON LEE BID

TV Receivers Selling Despite Color Dispute

Majority Of Firms Complacent, But Some Worry

Television receiver sales in the New York Metropolitan area have continued to hold their record high pace in the face of the general confusion and anxiety created by the color controversy over the FCC ruling, RADIO DAILY learned Friday in a survey of local dealers and dis-

(Continued on Page 7)

Webs And TvA Continue Negotiations

Following the scheduled meeting on Friday at which a new wage proposal was reported received from the networks, Television Authority, representing the TV performers, will hold membership meetings in Chicago and on the West Coast. Last week, George Heller, national executive secretary of Television Authority, said the networks' wage proposals so far were "ridiculous" and that unless the companies radically changed their proposals it might be serious. Negotiations got under way on Sept. 14, last.

Four ABC Executives Get Web Promotions

Four executive promotions within the ABC network [illegible]

NBC Affiliates End Fourth Convention

White Sulphur Springs, W. Va.—

Bid Of $12,320,000 Accepted For Coast Web

West Coast Bureau of RADIO DAILY

Hollywood — The Don Lee network on Friday became the property of the First National Bank of Akron, Ohio, when their bid of $12,320,000 was accepted over the $11,200,000 bid of Hoffman Radio Corporation made on October 6th. In raising the Hoffman bid by 10 per cent

(Continued on Page 5)

Coaxial-Cable Issue Clogs FCC's Docket

(Continued from Page 1)

hours, with 40 hours remaining open for further assignment.

FCC invited ABC, CBS, DuMont, NBC and "all TV station permittees and licensees who are now or may be customers for intercity video service" to file notice to intervene and participate. Filing deadline is Nov. 1.

Questions to be determined at the hearing include the lawfulness of the AT&T tariff schedules, allocations of usage of available intercity video transmission channels made by AT&T for the calendar quarter ending Dec. 31, the basis upon which such allocations were made, and "respondent's justification for such allocations, the bases upon which future allocations would be made by all respondent carriers and the justification therefor."

The Commission denied a petition of ABC for an "interpretive rule" with respect to the meaning of certain portions of the AT&T tariff in question "insofar as the petition requested an immediate ruling without public notice or hearing."

NAB headquarters is studying the FCC hearing notice to determine whether to intervene, said Charles Batson, NAB's TV director. TBA board probably will meet next week to determine [illegible]

★★ TELE TOPICS ★★

THE television premiere of the famed Dionne Quintuplets on WOR-TV Thursday night from the Alfred E. Smith Memorial Foundation dinner at the Waldorf-Astoria, caused the station's technical staff many anxious moments. It seems that electronic gremlins crept into the AT&T cable between the grand ballroom of the hotel and the master control of WOR-TV. The program scheduled for 10:15 p.m., actually didn't produce a picture until 15 minutes later. In the meantime the station carried the audio portion featuring the introductory remarks of Cardinal Francis Spellman. The picture returned in time to present the five girls and their classmates from Callander, Ontario, in their song recital. Photographically the presentation was only fair with Maria Dionne standing out as the most personable member of the group. Vocally they were pleasing.

☆ ☆ ☆ ☆

TODAY's TV Personality: LOUIS G. COWAN, head of the firm bearing his name, is widely known for his imaginative development of new radio and TV packages. Originator and producer of the "Quiz Kids" (on both radio and TV), Cowan boasts a long list of network and transcribed shows he has produced, including: "Stop the Music," the "Paul Winchell and Jerry Mahoney Program," the forthcoming Bert Parks afternoon TV show, and numerous local programs in New York and Chicago. During the war years, Lou was chief of the OWI's New York office. Prior to the war, he headed his own Chicago public relations firm, developing radio programs for Pure Oil, National Tea Co., Illinois Meat, and the Stevens Hotel. He is a University of Chicago graduate, married, and has four children.



COWAN

☆ ☆ ☆ ☆

FRED ALLEN fans are bristling with rage over the Life Magazine picture of [illegible]

TV Receivers Selling Despite Color Dispute

(Continued from Page 1)

tributors. The great majority of retailers polled reported set sales as "holding up." A few disclosed receiving some cancellations over the week-end when the color story first broke. But they insist that the loss is negligible and new orders continue to come in.

A spokesman for Bruno, Inc., the RCA distributor in New York, reported business as extremely good. Only one dealer cancellation was received due to the color mixup, he said; but this was more than nullified by the numerous requests from other dealers for deliveries to fill their needs.

Although the sales picture remains rosy, some retailers expressed concern over the future. They were thinking of the thousands of prospective customers who have been holding off buying TV sets. The muddled color situation can only influence them to wait longer, it was feared.

Some dealers are even debating the question of running TV clearance sales in the next few weeks. If customers begin to stay away, it may very well come to pass, it is believed.

On the manufacturing front, two [illegible]

728 B

EXHIBIT B

Bruno Statement
Variety, October 18, 1950

Black-White Video Pitch

Continued from page 1

any such move by the organization. Both Radio Corp. of America (and its National Broadcasting Co. subsid) and Pilot Radio, however, filed applications yesterday (Tues.) for injunctive action against CBS to hold its scheduled launching of commercial colorcast. RCA-NBC sued in Chicago; the Pilot action was brought in Brooklyn (N. Y.) federal court.

Illustrating the facets which the mass campaign might embrace, Crosley board chairman James D. Shouse warned newspaper owners yesterday of their heavy stake in informing the public fully on the "disastrous" potentialities of CBS color standards. Speaking at the third annual meeting of Newspaper Controllers and Finance Officers in Cleveland, Shouse said the viewing public faces a possible loss of [redacted] unbacked sets to receive colorcasts

color publicity has not dented the consumer demand for black-and-white sets. According to an exec of Bruno-N.Y., which distributes RCA products, "we haven't felt any impact from color at all and can still ship out every piece of TV equipment we can lay our hands on." A. Davega, prez of Davega Stores, estimated that cancellations of outstanding orders for black-and-white receivers represented only 1½% of the total. He noted, however, that a rush of buying last week might have been due to the new Federal restrictions on installment buying, which went into effect Saturday (14).

2. Distribution execs of the major manufacturers adopted an anti-CBS campaign, asking their distributors to protect their sale of black-and-white receivers [redacted] contact with the people." Signif-

CBS Invites All Comers

CBS prez Frank Stanton declared yesterday (Tues.) that he would be glad to provide time on the network Sunday (22) to the Radio-Television Manufacturers Assn. to answer his broadcast of last Sunday night (15). RTMA prez Robert C. Sprague had requested a comparable 15 minutes of CBS time that Stanton had assumed, between 6 and 6:30 p.m., for "rebuttal to attacks on TV manufacturers made by you last Sunday night."

Stanton said he would await final word from RTMA as to whom it would provide as a speaker before closing the time. In his wire to Stanton, Sprague requested the 15 minutes "in accordance with broadcasting regulations and traditions calling for equal time on both sides of controversial public issues."

partially scotched reports in a statement to distributors yesterday

[fol. 1101] EXHIBIT C

Affidavit of Grace Olsen

This is to certify that I, Grace Helen Olsen, have actually conducted the following 10 interviews in the Chicago Area, 10/26/50 and 10/27/50:

Carson, Pirie, Scott & Co.
Marshall, Field & Company.
Goldblatt's.
Hudson-Ross.
Dumke Radio Co.
Broadway Radio & Television Co.
Norshore Radio Service.
Terman Television Sales Co.
Havill's Radios & Appliances.
Norman Ross & Company.

Grace Helen Olsen.

My Commission Expires April 22, 1952. Jean W. Wakin, Notary Public, October 27, 1950.

[fol. 1102] Report of Calls Made on RCA Dealers, in the Chicago Area

1. *Carson, Pirie, Scott & Company* (Downtown) State & Madison Streets.

Salesman: Mr. Bruce Landis.
Date of call: 10/26/50.
Following models available for immediate delivery: (per inventory evening of 10/25/50).

9-T-89 "Sedgwick"—19-inch. screen—$750.00 plus tax
—1 in stock.
6-T-71 "Fairfield"— —$329.95 plus tax
—1 in stock.
6-T-53 "Newport"—16-inch. screen—$
—3 in stock.

Following other models commented upon:

6-T-86 "Rutland"—16-inch. screen — $525.00 — Not available now; have received 2 or 3 only in 3 months.

6-T-75 "The Modern"—16-inch screen—Have received only 1 model in 4 months.
6-T-84 "Fairfax"—16-inch. screen—Popular model, but not available.
No definite estimate given on models not available. Delivery could vary from 2 weeks to 3 months, per salesman. Also: only 16 inch models were on display in television section.

2. *Marshall, Field & Company* (Downtown), Washington & State Streets.
Salesman: Mr. E. J. Frederick.
Date of call: 10/26/50.
No R.C.A. models in stock at present time.
Delivery dates estimated on the following models:
6-T-72 "Fairfield"—16-inch screen—$330.00—delivery in 4-5 weeks.
6-T-75 "Modern"—16-inch screen—$370.00—delivery in 5 weeks.
6-T-64 "Kingsbury"—16-inch screen—$281.00—delivery in 8-10 weeks.
6-T-65 "Highland"—16-inch screen—$301.00—delivery in 4-5 weeks.
6-T-74 "Regency"—16-inch screen—$360.00—delivery in 4-5 weeks.
6-T-76 "Provincial"—16-inch screen—$390.00—delivery in 3-4 weeks.

3. *Goldblatt's* (Downtown), State & Van Buren Streets.
Salesman: Mr. W. Langer.
Date of call: 10/26/50.
Following models on display:
6-T-54 "The Kent"—16-inch screen—$249.95.
2-T-60 "Cumberland"—12½-inch screen—$209.95.
6-T-87 "Hartford"—16-inch screen—$575.00.
[fol. 1103]
6-T-75 "The Modern"—16-inch screen—$369.50.
9-T-77 "Hillsdale"—19-inch screen—$445.00
9-T-79 "Northampton"—19-inch screen—$450.00.
9-T-57 "York"—19-inch screen—$359.50.
2-T-51 "Shelby"—12½-inch screen $179.95.

Salesman could not indicate delivery on a given floor model until date of purchase. Estimated from 1 to 2 in

warehouse of any given floor model. However 15 stores draw on this inventory. Would not estimate wait on delivery of model not available in warehouse.

4. *Hudson-Ross* (Downtown), 141 S. Wabash Avenue.
Salesman: Mr. I. D. Waxman.
Date of call: 10/26/50.
Following models on display:

6-T-54 "Kent"—16-inch screen—$250.00.
6-T-71 "Fairfield"—no price given.

Above models may be available for delivery, but salesman would make no commitment until date of purchase.

5. *Dumke Radio Co.* (North Side), 1618 Howard Street.
Salesman: Mr. Erich Dumke.
Date of call: 10/27/50.
Following models available for immediate delivery: (1 of each in stock)

9-T-79 "Northampton"—19-inch screen—$450.00.
9-T-77 "Hillsdale"—19-inch screen—$425.00.
9-T-89 "Sedgwick"—19-inch screen—$750.00.
6-T-74 "Regency"—16-inch screen—$360.00.

Following model sold while in store:

6-T-54 "Kent"—16-inch screen—$249.95.

In RCA could make no other estimates of expectancy.

6. *Broadway Radio & Television* (North Side), 5530 N. Broadway.
Salesman: Mr. Graham.
Date of call: 10/27/50.
Following floor models available for immediate delivery: (1 of each)

6-T-86 "Rutland"—16-inch screen—$525.00.
9-T-79 "Northampton"—19-inch screen—$450.00.
9-T-89 "Sedgwick"—19-inch screen—$750.00.

[fol. 1104] There were 7 other models on the floor already "sold". (1 of each model) Interviewer identified the follow-

ing: (No price tags with identification on models; salesman refused to discuss models sold)

6-T-71 "Fairfield".
6-T-54 "Kent"—16-inch screen.
2-T-51 "Shelby"—12½-inch screen.

7. *Norshore Radio Service* (North Side), 6210 Broadway.
Salesman: Mr. Arthur Ross.
Date of call: 10/27/50.
Following models available for delivery within one week: (shipment received yesterday and another shipment expected before November 1st) (1 of each model)

9-T-57 "York"—19-inch screen—$325.00.
6-T-64 "Kingsbury"—16-inch screen—$279.95.
6-T-71 "Fairfield"—16-inch screen—$329.95.
6-T-74 "Regency"—16-inch screen—$359.95.
2-T-81 "Somervell"—12½-inch screen—$329.95.
2-T-81 "Somervell" — 12½-inch screen — $349.95 (Blonde).
6-T-84 "Fairfax"—16-inch screen—$459.95.

Salesman commented that six additional sets in RCA had already been sold that morning. (11 a.m. time of interview) Did not indicate what models sold. Also commented, with reference to models 9-T-89 "Sedgwick" and 6-T-87 "Hartford", that they hadn't received shipments of said models in a long time.

8. *Terman Television Sales Co., Inc.* (South Side) 2115 E. 71st Street.
Salesman: Mr. Goking.
Date of call: 10/27/50.
Three R.C.A. models in the store; two of these available for immediate delivery:

6-T-84 "Fairfax"—16-inch screen—$459.50.
2-T-81 "Somervell"—12½-inch screen—$329.95.

Other model "sold" was 6-T-53 "Newport"—16-inch screen.
Salesman commented that whatever models are shipped to him move almost immediately. In the whole store, all models, no more than 12 sets were available—remainder on floor had been sold since yesterday.

[fol. 1105] 9. *Havill's Radios and Appliances* (South Side), 1461 E. 55th Street.

Salesman: Mr. Havill.

Date of call: 10/27/50.

Following models available for immediate delivery in quantities indicated:

6-T-71 "Fairfield"—16-inch screen—$329.95. (1 in stock)
6-T-54 "Kent"—16-inch screen—$249.95. (1 in stock)
9-T-256 12-inch screen—$229.95. (2 in stock)
2-T-51 "Shelby"—12½-inch screen—$179.95. (2 in stock)
6-T-76 "Provincial"—16-inch screen—$389.50. (1 in stock)
6-T-65 "Highland"—16-inch screen—$299.95. (1 in stock)
9 P.C.-41—$795.00. (1 in stock for over 6 months)

10. *Norman Ross & Company* (Suburban), 617 Davis Street, Evanston, Illinois.

Salesman: Mr. Gerald K. Howson.

Date of call: 10/27/50.

Following models available for immediate delivery (1 of each):

9 PC41C 21-inch screen—$795.00.
9-T-79 "Northampton"—19-inch screen—$450.00.
6-T-71 "Fairfield"—16-inch screen—$329.50.

Salesman would make no estimates on delivery of a given model placed "on order."

Grace H. Olsen.

Interviewer: Grace H. Olsen, Research Department, McCann-Erickson, Inc., 318 S. Michigan Ave., Chicago, Ill.

[fol. 1106] EXHIBIT D

Affidavit of Sydonia Stanislaw

STATE OF NEW YORK,
County of New York, ss:

Sydonia Stanislaw, being duly sworn, deposes and says:

I am account research manager in the central research department of McCann-Erickson, Inc., 50 Rockefeller Plaza, New York, N. Y.

On October 25, 26, 27, 1950, I made the shopping survey attached hereto.

I hereby certify that the reports on each store are an accurate account of what transpired on that shopping survey.

Sydonia Stanislaw.

Sworn to before me this 9th day of November, 1950.
Edna C. Buchanan.

Edna C. Buchanan, Notary Public for the State of New York, No. 41-55036-0; Qualified in Queens County. Certificates filed with Queens & N. Y. Co. Clerks & Registers. Term Expires March 30, 1952.

[fol. 1107] Results of Shopping for RCA Television Receivers in New York Retail Stores

Made by Miss Sydonia Stanislaw, Account Research Manager in the McCann-Erickson Central Research Department.

[fol. 1108] Shopping for R.C.A. Television Set

Macy's: The salesman informed me that they are not taking orders for any R.C.A. television sets at the present time.

[fol. 1109] Liberty Music Shop: 50th Street and Madison Avenue

The salesman here told me that RCA television sets are quite scarce. He couldn't say when any particular model would be available as it depends on when a shipment comes in. He said that the situation changes from day to day and a model available today may not be there tomorrow. He

said that the 16" screen was the more popular size and therefore difficult to get. He thought he could probably get a Regency 16" model within two or three weeks.

[fol. 1110] May E., Inc.: 1309 6th Avenue

The salesman informed me that he had one RCA set, a TV-Radio-Phonograph model, in stock. He told me that if I put in my order for a set, he thought he might be able to get it for me within a few days.

[fol. 1111] Davega: 152 West 42nd Street

RCA sets were in short supply here also. The salesman was obviously very anxious to sell me a set, however, and asked me to choose some model and he would see what he could do for me. I chose the Regency 16" screen console and he told me that I had chosen a model which is one of the hardest to get. However, he said that he would make a couple of telephone calls and that if I really wanted it he would do his utmost to get *if* for me before the excise tax comes into effect.

[fol. 1112] Davega: 2369 Broadway

The salesman told me that they had no RCA set available for immediate delivery. He offered to take my order, however. He told me that the Regency 16" and the Fairfield 16" were the most easily available and that he could get one for me in a few weeks. He couldn't tell me how long I would have to wait for other models, but said that table models were even more difficult than the two consoles mentioned above, and that the 19" screen models were the most difficult to get of all of them.

[fol. 1113] Shearn's: 1120 Madison Avenue

Since a shipment arrived yesterday, the salesman said that they have many models available. However, he said that they haven't been taking any orders during the past two weeks because of scarcity and the uncertainty as to when a shipment would come in. He said that they generally sell only from stock as they do not like to make customers wait for an indefinite period of time.

[fol. 1114] Radio Clinic, Inc.: 2290 Broadway

The salesman told me that he had in stock for immediate delivery the Regency 16" console; Fairfield 16" console; table models with 12½" and 16" screens; and a table model with 19" screen in the warehouse.

[fol. 1115] Dynamic: 1926 Broadway

Only the Provincial 16" console was available for immediate delivery. The Kent 16" table model and the Regency 16" console could be had in ten days. He was uncertain about the others and said it would take longer to get them. He singled out the three models above as being the easiest to get.

[fol. 1116] Master's: Master's is taking orders but cannot promise delivery for two or three months.

[fol. 1117] Rabson's: 111 West 52nd Street

Rabson's are not taking orders at the present time. The salesman said that the demand has been terrific and said it was probably due to the 10 per cent excise which will become effective November 1st. He said that he might take my order after November 1st.

[fol. 1118] Marconi Bros.: 864 Lexington Avenue

This store had the following models available for immediate delivery:

Fairfield 16" screen console; Northampton 19" console; Provincial 16" console; Hillsdale 19" console; the Kent (table model) 16". As for other models, the salesman couldn't say when they would be available as everything depends on when the next shipment comes in.

[fol. 1119] Bloomingdale's: There were no R.C.A. television sets in this store. The salesman said that he could give me any other brand, however. Since I insisted on an RCA set, he offered to take my name down and would call me when the model I chose came in. He said that he generally did not make a practice of doing this as he was in no position to make any promises as to when delivery could be made. However, the fact that he would write my name down would in no way obligate me and if I could get a set elsewhere it would be all right.

The salesman was very puzzled by the scarcity of RCA sets and said that they receive one or two RCA sets to 10 or 15 pieces of some other brand.

When I told him I might try a small independent, he believed that my chances of getting a TV set there were slight. He thought that if a big store like Bloomingdale's couldn't get any, the small independent couldn't either.

[fol. 1120] Gimbel's: Some television sets were available for delivery before November 1st. Sets available; TV-radio-phonograph combination in 12" and 16" screens. A console model—16" screen (Regency). The table model, 16" screen—not available at present. Another model, TV-phonograph combination with 16" screen not available.

(Here follow 2 photolithographs, folios 1121-1122)

EXHIBIT E

Dynamic Advertisement
New York Times, October 25, 1950

Dynamic's answer to the TV Color Question

As one of America's leading television retailers, with more than 100,000 satisfied customers on our books, and with a strong sense of obligation and responsibility to the public we serve, we take this means of stating our position on the TV color question.

The question uppermost in the minds of most people is: "Will my television set be obsolete when color comes?" Our answer is a positive and emphatic **"NO!"**

It is Dynamic's firm and considered opinion, based on our own careful analysis and on the judgment of practically every responsible leader in the television industry, that the vast majority of television programs will continue to be broadcast in black and white for many years to come.

Furthermore, the set you now own or intend to buy will receive color, if you so desire, through the use of color converters.

There has been much talk and speculation about the cost of color converters and adapters. Dynamic takes the guesswork out of the color question with this unqualified guarantee to anyone who is thinking of buying a television set at Dynamic Stores:—

DYNAMIC'S UNQUALIFIED OFFER!

BUY YOUR TELEVISION SET NOW!

- DYNAMIC guarantees to furnish you with a color converter and/or adapter as required, when they are available, at a price of **$49.50 OR LESS!**
- This guarantee will be given to you in writing. It applies to all the leading brands of television which we sell in our fifteen stores. These respected brands are listed below.

REMEMBER — THE 10% EXCISE TAX ON TV BECOMES EFFECTIVE NOV. 1st

DYNAMIC STORES feature these leading, nationally famous brands of television sets:--

ADMIRAL • ANSLEY • BENDIX • CAPEHART
DuMONT • EMERSON • FREED-EISEMANN
GENERAL ELECTRIC • HALLICRAFTERS
KAYE-HALBERT • MAJESTIC MOTOROLA
OLYMPIC • PHILCO • RCA VICTOR • SHAW
SENTINEL • STROMBERG-CARLSON • ZENITH

TAKE 65 WEEKS TO PAY

ENJOY TELEVISION NOW!

Enjoy television's millions of dollars worth of entertainment in the comfort of your own home, every day, every night. Great stars, thrilling sports events, news, music, movies, opera, comedy, variety, children's programs. Entertainment for every member of the family at a cost so phenomenally low when compared to other forms of entertainment that you really cannot deprive your family of its enjoyment. With Dynamic's guarantee that your set can be converted to color—there is no reason to hesitate a moment longer. Visit your nearest Dynamic store today.

Dynamic STORES

FREE HOME DEMONSTRATION

For an absolutely free home demonstration of any of the famous television brands listed, call—

In New York call: TRafalgar 3-2025
In New Jersey call: MArket 2-1320

15 GREAT DYNAMIC STORES TO SERVE YOU

MANHATTAN
*1976 Broadway
37 W. 57th St.
878 Sixth Ave.
BRONX
*3089 Third Ave.
*3952 White Plains Rd.
BROOKLYN
*669 Myrtle Ave.
*630 Fifth Ave.
QUEENS
*90-61 Queens Blvd.
*91-04 Jamaica Ave.
STATEN ISLAND
*61 Victory Blvd.
YONKERS
*467 South Broadway (at Ashburton Ave.)
PORTCHESTER
*581 Westchester Ave. (at Main St.)
NEW JERSEY
*5509 Bergenline Ave.
WASHINGTON, D. C.
1300 G St. N. W.
BRIDGEPORT, CONN.
*630 Boston Ave.
*Stores Open to 10 P. M. Daily

1121

Exhibit 7

Davega Advertisement
New York Times, October 27, 1950

BUY YOUR TELEVISION NOW WITH CONFIDENCE at DAVEGA

7.1 YEARS OF DEPENDABILITY

The Story about Color Television in Black and White

BLACK and WHITE TELEVISION

Now "The Greatest Show on Earth," costing over 100 million dollars, is yours on today's TV. It's an ever-growing cavalcade including drama, comedy, music, news, sports, children's programs —available day after day throughout the year.

Nobody is going to obsolete over 10(million dollars worth of TV entertainment now reaching the millions of set owners who comprise the only existing audience for sponsors and talent. No other form of television can so richly reward its owners now, or for a long time to come.

COLOR TELEVISION

Some day, color will have a place in television programming, just as you now see some movies in color.

When color telecasting becomes a factor, this supplementary broadcasting service can be received in color by adding a suitable converter and or adapter to current television models.

Davega pledges to sell the finest in color converters and adapters, when available—at the lowest prices possible.

No other form of television can so richly reward its owners now, or for a long time to come.

You can buy your new TV set at Davega with confidence that you will continue to enjoy this tremendous variety of superb home entertainment.

Yes, you can buy today at Davega—with confidence. So why wait? Why pass up all the fine entertainment that is yours right now? Start tomorrow to enjoy all the pleasure television will add to your family life!

DAVEGA, PIONEER IN TELEVISION, HAS SOLD OVER $25,000,000 WORTH OF NATIONALLY FAMOUS TELEVISION SETS

Admiral *DuMont* *Emerson* *Philco* *Teletone*
General Electric *Hallicrafters* *Motorola* *Trav-Ler*
Westinghouse *RCA Victor* *Stromberg-Carlson* *Zenith*

Davega Color Television Guarantee

(IN PART)

Davega Stores Corporation guarantees to all past and future purchasers of television receivers, that their sets can be adapted to receive color television programs transmitted in accordance with standards established by the Federal Communications Commission on October 10th, 1950.

25 Conveniently Located Stores to Serve You

DAVEGA

MANHATTAN
• Store Open Evenings
Downtown 290 Broadway
Store 13th St 821 Broadway
Store Commodore 111 E. 42nd St
• Times Square 152 W. 42nd St
Empire State 18 W. 34th St
• Madison Sq. Garden 628 8th Ave

BRONX
• 84th St 2380 Broadway
• Morrisania 1215 W. 128th St
• Fordham 31 E. Fordham Rd

BROOKLYN
• 182nd St 3020 Third Ave
• Boro Hall 380 Fulton St
• Flatbush 926 Flatbush Ave

QUEENS
• Kings Highway 1904 Kings Hwy
• Bay Ridge 8108 8th Ave
• Jamaica 161-24 Jamaica Ave

LONG ISLAND
• Astoria 31-98 Steinway St
• Flushing 38-11 Main St
• Hempstead 45 Main St

NEW JERSEY
• Newark 110 Market St
• Jersey City 99 Journal Square
• Paterson 488 Main St

WESTCHESTER
New Brunswick 373 George St
• White Plains 175 Main St

1122

[fol. 1123] EXHIBIT G

A Survey of Business Conditions Among Major Brand Retailers and Wholesalers of Television Receivers

A Report for

Columbia Broadcasting System, Inc.

Dun & Bradstreet, Inc.

[fol. 1124] Prepared by Business Information Division

Dun & Bradstreet, Inc.

November 7 and 8, 1950

[fol. 1125] Table of Contents

	Original
Foreword	1
Questionnaire	2
Breakdown of Interviews	3
Question 1. Were Your Television Set Dollar Sales in October Higher, Lower, or About the Same as Those in September?	5
Question 2. Which Do You Think Are the Three Most Important Factors (In Order of Importance) Responsible for This Change?	6
Question 3. Were Your October Sales in Line With Your Expectations?	10
Question 4. Are Your Sales Up to Today in November Excellent, Good, Fair, or Poor?	14
Question 5. Have Cancellations of Orders by Your Customers, if Any, Over the Last Two Weeks Been Normal, High, or Low?	17
Question 6. As of Today Are Any of the Following Factors Unfavorably Affecting Your Sales: Shortages of Sets, Color, Regulation W, New Excise Tax?	20
Brands of Television Sets Carried	23

[fol. 1126] Foreword

The Business Information Division of Dun & Bradstreet was asked by the Columbia Broadcasting System, Inc., to conduct personal interviews with owners or principal buyers of selected retail and wholesale television outlets.

The purpose of the interviews was to obtain up-to-date information concerning the volume of recent sales and opinions as to the factors affecting them. This assignment was received on November 6 and completed on November 9.

Each of the 39 Dun & Bradstreet district offices located in a television area was assigned a quota of *retail* television outlets to be covered in the survey. These quotas were approximately proportionate to the estimated number of television homes in these cities. In addition, eight of the nine Dun & Bradstreet regional offices were assigned a quota of *wholesale* television outlets similarly apportioned; the remaining regional office, Dallas, was excluded because of its relative unimportance as a television area to date. The Dun & Bradstreet offices were instructed to select their quotas of individual outlets from among the leading retailers and/or wholesalers carrying the following major brands of television sets: Admiral, Crosley, Dumont, Emerson, General Electric, Hallicrafter, Hoffman, Motorola, Philco, RCA, and Zenith.

The total quotas of interviews were 675 retailers and 75 wholesalers. A total of 639 usable retail and 64 usable wholesale interviews were completed. The detail of the quotas and completions are given on page 3.

The interviews were conducted with the owner or the principal buyer in each of the selected outlets. The questionnaire used in these interviews is reproduced on page 2.

[fol. 1127] Questionnaire

1. Were your television set dollar sales in October higher, lower or about the same as those in September?

2. Which do you think are the three most important factors (in order of importance) responsible for this change?

3. Were your October sales in line with your expectations? If yes, conclude this question; if no, ask if sales were above or below expectations. In either case ask reasons why.

4. Are your sales up to today in November excellent, good, fair or poor? What do you think accounts for this?

5. Have cancellations of orders by your customers, if any, over the last two weeks (repeat two weeks) been

normal, high or low? If response is either high or low ask what in your opinion are the reasons. Please press for specific reasons.

6. As of today are any of the following factors unfavorably affecting your sales: Shortages of sets—color—Regulation W—new excise tax—if answer is yes list in the order of importance.

[fol. 1128]

Breakdown of Interviews

City	Retailers				Wholesalers			
	Assigned		Obtained		Assigned		Obtained	
	#	%	#	%	#	%	#	%
Albany	9	1.3	8	1.3	...	...	...	...
Atlanta*	6	.9	6	.9	1	1.3	1	1.6
Baltimore	20	3.0	20	3.1	...	...	...	...
Birmingham	1	.2	1	.2	...	...	...	...
Boston*	48	7.1	43	6.7	8	10.7	8	12.5
Buffalo	11	1.6	11	1.7	...	...	...	...
Chicago*	59	8.7	59	9.2	10	13.3	10	15.6
Cincinnati	16	2.4	16	2.5	...	...	...	...
Cleveland*	28	4.2	...	...	5	6.7	...	...
Columbus	8	1.2	8	1.3	...	...	...	...
Dallas*, **	4	.6	4	.6	...	...	...	...
Des Moines	1	.2	1	.2	...	...	...	...
Detroit	30	4.4	30	4.7	...	...	...	...
Houston	3	.4	3	.5	...	...	...	...
Indianapolis	7	1.0	7	1.1	...	...	...	...
Jacksonville	1	.2	1	.2	...	...	...	...
Kansas City	5	.7	5	.8	...	...	...	...
Los Angeles*	63	9.3	63	9.9	11	14.7	11	17.2
Louisville	4	.6	4	.6	...	...	...	...

* Indicates a Dun & Bradstreet regional office.

** The Dallas regional office was not assigned a "wholesaler" quota, since it represented but a fraction of an interview.

[fol. 1129]

Breakdown of Interviews (Cont.)

City	Retailers				Wholesalers			
	Assigned		Obtained		Assigned		Obtained	
	#	%	#	%	#	%	#	%
Memphis	5	0.7	5	0.8	..	....	..	....
Milwaukee	15	2.2	15	2.3	..	....	..	....
Newark	31	4.6	31	4.8	5	6.7	5	7.8
New Haven	10	1.5	10	1.6	..	....	..	....
New Orleans	3	0.4	3	0.5	..	....	..	....
New York*	127	18.9	123	19.1	22	29.3	16	25.0
Omaha	3	0.4	3	0.5	..	....	..	....
Philadelphia*	58	8.6	60	9.4	10	13.3	10	15.6
Pittsburgh	13	1.9	13	2.0	..	....	..	....
Providence	8	1.2	8	1.3	..	....	..	....
Richmond	4	0.6	4	0.6	..	....	..	....
Rochester	5	0.7	5	0.8	..	....	..	....
St. Louis*	16	2.4	16	2.5	3	4.0	3	4.7
St. Paul	12	1.8	12	1.9	..	....	..	....
Salt Lake City	2	0.3	2	0.3	..	....	..	....
San Francisco	8	1.2	8	1.3	..	....	..	....
Seattle	3	0.4	3	0.5	..	....	..	....
Syracuse	6	0.9	6	0.9	..	....	..	....
Toledo	6	0.9	6	0.9	..	....	..	....
Washington	16	2.4	16	2.5	..	....	..	....
Total	675	100.0%	639	100.0%	75	100.0%	64	100.0%

* Indicates a Dun & Bradstreet regional office.

[fol. 1130]

Question 1

"Were your television set dollar sales in October higher, lower, or about the same as those in September?"

	Retailers		Wholesalers	
	#	%	#	%
Higher	378	59.2	40	62.5
Lower	156	24.4	8	12.5
Same	105	16.4	16	25.0
Don't know	..	....	..	....
Total	639	100.0%	64	100.0%

[fol. 1131]

Question 2

"Which do you think are the most important factors (in order of importance) responsible for this change?"

(Analyzed by those retailers whose dollar sales in October were *higher* than those in September.)

	Retailers					
	First		Second		Third	
Factors	#	%	#	%	#	%
Excise tax	271	71.8	52	13.8	15	4.0
Regulation W	23	6.1	43	11.4	12	3.2
Seasonal demand	22	5.8	58	15.3	16	4.2
Higher prices	7	1.9	14	3.7	4	1.1
Co-axial cable	5	1.3	3	.8	...	.....
Promotion and advertising	5	1.3	7	1.9	9	2.4
War scare	10	2.6	13	3.4	4	1.1
Shortage of sets	5	1.3	31	8.2	33	8.7
Availability of material	...	.....	2	.5	3	.8
Better selection of sets	3	.8	8	2.1	5	1.3
Business conditions	2	.5	1	.3	2	.5
Increase in demand	4	1.1	8	2.1	9	2.4
Premature buying	14	3.7	3	.8	3	.8
Better programs	2	.5	15	4.0	12	3.2
All others	3	.8	8	2.1	6	1.6
No answer	2	.5	112	29.6	245	64.7
Total	378	100.0%	378	100.0%	378	100.0%

[fol. 1132]

Question 2

"Which do you think are the most important factors (in order of importance) responsible for this change?"

(Analyzed by those Wholesalers whose dollar sales in October were *higher* than those in September.)

	Wholesalers					
	First		Second		Third	
Factors	#	%	#	%	#	%
Excise tax	27	67.5	8	20.0	...	.....
Regulation W	1	2.5	5	12.5	2	5.0
Shortage of sets	1	2.5	2	5.0	...	.....
Seasonal variation	4	10.0	2	5.0	...	.....
Advertising	1	2.5	...	.....	2	5.0
Increased interest in television	...	.....	2	5.0	2	5.0
Availability of merchandise	...	.....	1	2.5	1	2.5
Better programs	...	.....	2	5.0	1	2.5
War scare	...	.....	1	2.5	3	7.5
General business conditions	...	.....	1	2.5	2	5.0
Good delivery	1	2.5	3	7.5	3	7.5
Increased demand	...	.....	1	2.5	2	5.0
More production	4	10.0	1	2.5	1	2.5
Priced better	1	2.5	1	2.5	1	2.5
No answer	...	.....	10	25.0	20	50.0
Total	40	100.0%	40	100.0%	40	100.0%

[fol. 1133]

Question 2

"Which do you think are the most important factors (in order of importance) responsible for this change?"

(Analyzed by those retailers whose dollar sales in October were *lower* than those in September.)

Factors	Retailers					
	First		Second		Third	
	#	%	#	%	#	%
Color television	37	23.7	47	30.1	16	10.2
Regulation W	79	50.6	35	22.4	11	7.0
Excise tax	7	4.5	17	10.9	17	10.9
Set shortage	13	8.3	10	6.4	10	6.4
War scare	3	1.9	6	3.9	2	1.3
Higher price	3	1.9	5	3.2	7	4.5
Premature buying	7	4.5	..	.....	2	1.3
Business conditions	5	3.2	4	2.6	5	3.2
Less expensive sets	..	.....	..	.....	1	.7
All others	1	.7	5	3.2	2	1.3
No answer	1	.7	27	17.3	83	53.2
Total	156	100.0%	156	100.0%	156	100.0%

[fol. 1134]

Question 2

"Which do you think are the three most important factors (in order of importance) responsible for this change—"

(Analyzed by those wholesalers whose dollar sales in October were *lower* that in September.)

Factors	(Base=8 Wholesalers)		
	First	Second	Third
Shortage	5	1	..
Regulation W	1	..	2
Excise tax	..	..	..
Color television	1	2	..
Premature buying	1	..	..
Total	8	3	2

[fol. 1135]

Question 3

"Were your October sales in line with your expectations?"

	Retailers		Wholesalers	
	#	%	#	%
Yes	366	57.3	42	65.6
No	270	42.2	22	34.4
No answer	3	.5	..	.....
Total	639	100.0%	64	100.0%

[fol. 1136]

Question 3

"Were your October sales in line with your expectations?"

(Analyzed by those respondents who indicated that October sales were *not* in line with their expectations.)

	Retailers		Wholesalers	
	#	%	#	%
Above expectations	131	48.5	16	72.7
Below expectations	139	51.5	6	27.3
No answer	...	.....	...	.....
Total	270	100.0%	22	100.0%

[fol. 1137]

Question 3

"Were your October sales in line with your expectations?"

(Analyzed by the reasons given by retailers who indicated that October sales were *not* in line with their expectations.)

Reasons	Retailers	
	#	%
Above expectations	131	100.0
Excise tax	96	73.3
Advertising	4	3.1
War scare	9	6.9
Premature buying	4	3.1
Regulation W	12	9.2
Co-axial cables	3	2.3
Business conditions	3	2.3
Increased interest in TV	4	3.1
Seasonal	3	2.3
Shortage	21	16.0
All other	17	13.0
No answer	4	3.1
Below expectations	139	100.0
Color television	64	46.0
Regulation W	78	56.1
War scare	5	3.6
Shortage	23	16.5
Excise tax	14	10.1
Higher price	9	6.5
Seasonal	3	2.2
All other	9	6.5
No answer	12	8.6

Note: A number of respondents gave more than one reason.

[fol. 1138]

Question 3

"Were your October sales in line with your expectations?"

(Analyzed by the reasons given by wholesalers who indicated that October sales were *not* in line with their expectations.)

Reasons	Number of Wholesalers
Above expectations	16
Excise tax	8
Increased delivery	2
Advertising	2
Demand for popular priced lines	1
Regulation W	1
Increased production	1
Business conditions	1
Seasonal	1
No answer	4
Below expectations	6
Color television	3
Regulation W	2
No answer	2

Note: A number of respondents gave more than one reason.

[fol. 1139]

Question 4

"Are your sales up to today in November excellent, good, fair, or poor?"

	Retailers		Wholesalers	
	#	%	#	%
Excellent	14	2.2	14	21.9
Good	95	14.9	17	26.5
Fair	223	34.9	17	26.6
Poor	302	47.2	11	17.2
No answer	5	.8	5	7.8
Total	639	100.0%	64	100.0%

[fol. 1140]

Question 4

"Are your sales up to today in November excellent, good, fair, or poor?"
(Analyzed by reasons retailers gave for the condition of their sales in November.)

Reasons	Excellent (14=100%)		Good (95=100%)		Fair (223=100%)		Poor (302=100%)	
	#	%	#	%	#	%	#	%
Excise tax	2	14.3%	13	13.7%	115	51.6%	155	51.3%
Regulation W	2	14.3	7	7.4	72	32.3	109	36.1
Premature buying	..	....	2	2.1	14	6.3	34	11.3
Price increases	..	....	3	3.2	7	3.1	15	5.0
Color television	..	....	4	4.2	42	18.8	50	16.6
Shortage of sets	2	14.3	5	5.3	13	5.8	11	3.6
Business conditions	1	7.1	3	3.2	1	0.4	14	4.6
Scare and novelty buying over	..	....	..	....	10	4.5	16	5.3
Tax free sets on hand	3	21.4	17	17.9	..	....	1	0.3
Seasonal Buying	2	14.3	9	9.5	4	1.8	3	1.0
War scare	2	14.3	1	1.1	4	1.8	5	1.7
Advertising	2	14.3	6	6.3	2	0.9	2	0.7
Interest in television	..	....	6	6.3	2	0.9	..	....
Demand	..	....	8	8.4	..	....	..	....
Public confusion	..	....	..	....	4	1.8	3	1.0
Election	..	....	..	....	4	1.8	3	1.0
First-of-month sales slow	..	....	..	....	4	1.8	2	0.7
More sets available	..	....	6	6.3	..	....	..	....
Other	1	7.1	1	1.1	4	1.8	5	1.7
No answer	1	7.1	22	23.2	30	13.5	27	8.9

[fol. 1141]

Question 4

"Are your sales up to today in November excellent, good, fair, or poor?"
(Analyzed by reasons wholesalers gave for the condition of their sales in November.)

Reasons	Excellent	Good	Fair	Poor
(Number of respondents)	(14)	(17)	(17)	(11)
Excise tax	..	5	11	8
Regulation W	..	..	6	3
Color television	..	..	3	3
Premature buying	1	2	1	2
Increased demand	2	2	..	..
Tax free sets on hand	2	1	..	..
Increased production	1	1	..	..
Good delivery	2	1	..	..
Better programs	1	1	..	..
Quality of product	2	..	..	..
All other	1	8	2	2
No answer	3	2	2	..

Note: A number of respondents gave more than one reason.

[fol. 1142]

Question 5

"Have cancellations of orders by your customers, if any, over the last two weeks been normal, high, or low?"

	Retailers		Wholesalers	
	#	%	#	%
Normal	342	53.5	39	60.9
High	46	7.2	4	6.3
Low	81	12.7	7	10.9
No cancellations (volunteered)	142	22.2	14	21.9
No orders taken	16	2.5	...	.....
No answer	12	1.9	...	.....
Total	639	100.0%	64	100.0%

[fol. 1143]

Question 5

"Have cancellations by your customers, if any, over the last two weeks been normal, high, or low?"

(Analyzed by the reasons given by retailers who indicated that cancellations by customers had been high or low over the last two weeks.)

Reasons	Retailers	
	#	%
High cancellations	46	100.0
Regulation W	15	32.6
Color TV	14	30.4
Tax	11	23.9
Shortage of sets	10	21.7
Business conditions	2	4.3
Premature buying	1	2.2
Other	10	21.7
Low cancellations	81	100.0
Few advance orders	13	16.0
Service and delivery	13	16.0
Sales promotion and advertising	8	9.9
Demand	7	8.6
Tax	5	6.2
Buyers decision made	4	4.9
Sells to upper class	4	4.9
Fears of shortage	3	3.7
Other	10	12.3
No answer	22	27.2

[fol. 1144]

Question 5

"Have cancellations by your customers, if any, over the last two weeks been normal, high, or low?"

(Analyzed by the reasons given by wholesalers who indicated that cancellations by customers had been high or low over the last two weeks.)

Reasons	Number of Wholesalers
High cancellations	4
Color television	1
Excise tax	3
Regulation W	1
War scare	1
Low cancellations	7
Not felt at wholesale level	1
Backlog of orders on popular priced sets	1
Dealers don't want to stock	1
Allocate sets	1
Tax free sets on hand	1
Excise tax	1
No answer	1

Note: A number of respondents gave more than one reason.

[fol. 1145]

Question 6

"As of today are any of the following factors unfavorably affecting your sales: shortages of sets, color, Regulation W, new excise tax?"

	Retailers		Wholesalers	
	#	%	#	%
Yes	601	94.0	60	93.7
No	30	4.7	4	6.3
No answer	8	1.3	..	.....
Total	639	100.0%	64	100.0%

[fol. 1146]

Question 6

"As of today, are any of the following factors unfavorably affecting your sales: shortages of sets, color, Regulation W, new excise tax?" (Analyzed by the 601 retailers who indicated, in the order of their importance, that any one of these items was affecting their sales unfavorably.)

	Total		1		2		3		4		Doesn't Affect	
	#	%	#	%	#	%	#	%	#	%	#	%
Shortage of sets	601	100	78	13.0	70	11.7	79	13.1	97	16.1	277	46.1
Color	601	100	92	15.3	114	19.0	146	24.3	57	9.5	192	31.9
Regulation W	601	100	204	33.9	155	25.8	72	12.0	31	5.2	139	23.1
Excise tax	601	100	227	37.8	194	32.3	77	12.8	8	1.3	95	15.8

[fol. 1147]

Question 6

"As of today, are any of the following factors unfavorably affecting your sales: shortages of sets, color, Regulation W, new excise tax?"

(Analyzed by the 60 wholesalers who indicated, in the order of their importance, that any one of these items was affecting their sales unfavorably.)

	Total		1		2		3		4		Doesn't Affect	
	#	%	#	%	#	%	#	%	#	%	#	%
Regulation W	60	100	26	43.3	14	23.3	7	11.7	1	1.7	12	20.0
Excise tax	60	100	20	33.3	20	33.3	5	8.3	1	1.7	14	23.4
Shortage of sets	60	100	10	16.7	4	6.6	11	18.3	4	6.7	31	51.7
Color	60	100	4	6.7	10	16.7	13	21.6	10	16.7	23	38.3

[fol. 1148]

Brands of Television Sets Carried

Brand	Retailers (639=100%) #	Retailers (639=100%) %	Wholesalers (64=100%) #	Wholesalers (64=100%) %
Admiral	354	55.4	6	9.4
Crosley	152	23.8	5	7.8
Dumont	144	22.5	7	10.9
Emerson	179	28.0	5	7.8
G. E.	257	40.2	4	6.2
Hallicrafter	98	15.3	4	6.2
Hoffman	50	7.8	2	3.1
Motorola	303	47.4	5	7.8
Philco	340	53.2	7	10.9
RCA	427	66.8	6	9.4
Zenith	276	43.2	4	6.2
All others	312	48.8	12	18.5
No answer	16	2.5	..	....

Note: Some wholesalers and most retailers carried more than one brand.

[fol. 1149] In United States District Court

Affidavit of Earl W. Muntz—Filed November 13, 1950.

County of Cook,
State of Illinois, ss:

Earl W. Muntz, being duly sworn, deposes and says:

1. I am the Vice-President of Muntz TV Inc. a manufacturer of television sets, with principal offices at 3150 Lincoln Avenue, Chicago, Illinois.

Muntz TV, Inc. has followed with great interest the FCC color decision of October 10, 1950. Muntz TV, Inc. has developed and is going to manufacture and market a "Color Companion," a television receiver which will receive color telecasting on the new FCC-approved standards. This "Color Companion" is being engineered to integrate with any color television system.

Muntz TV, Inc. is receiving orders on its "Color Companion" at the present time. Production of 20 units has already been begun and it is expected that that rate will accelerate as the public demand for color increases.

2. The FCC color television announcement on October 10, 1950 has had no substantial effect whatsoever on the sale of black and white television receivers manufactured by Muntz TV, Inc.

On October 27, 1950, Muntz TV, Inc. ran full-page newspaper advertisements headlining the words "Color Is Here" in all of the major New York and (*other cities*) newspapers (see attached copy of advertisement). As a direct result of that advertising campaign, Muntz TV sales doubled or tripled in the days immediately following the [fol. 1150] appearance of the advertisements. The clear indication is that the public, reassured that any set which it buys today will be able to receive color on the CBS system whenever its favorite programs are telecast in color, will continue to buy the present black and white receivers without fear.

Sales for the past four weeks are as follows:

Period	Units Sold
Week ending Oct. 7	1553
Week ending Oct. 14	2304
Week ending Oct. 21	2417
Week ending Oct. 28	4914

It is of significance that Muntz TV sales of black and white receivers have been unaffected by the FCC color announcement thus far, particularly since our advertising expenditures have been more or less uniform throughout the period of the last four weeks.

Earl W. Muntz.

Sworn to before me this 8th day of November, 1950.
Elyse Endt. (Seal.)

(Here follows 1 photolithograph, side folio 1151)

Muntz TV Advertisement
New York Daily News, October 27, 1950

An open letter to all MUNTZ TV owners

(present and future:)

If the current controversy over color television has created a doubt in your mind, dismiss it immediately!! As a Muntz TV owner, present or future, you can relax in the comforting knowledge that your present set is ready...on a moment's notice...for low-cost application of the FCC-approved CBS color system. PRODUCTION ACTIVITY ON THE NEW MUNTZ COLOR UNIT HAS ALREADY BEGUN!

Muntz TV, Inc., is not primarily concerned about the debate now raging as to the merit of one system over another...except to recognize the stark fact that Color has been approved; that the FCC saw fit to authorize the CBS system; and that Muntz' responsibility in the matter lies in providing all Muntz TV owners with low-cost Color reception as quickly as possible, no matter the system chosen.

THE IMPORTANT THING TO REMEMBER IS THIS: Your Muntz TV was (and is being) engineered to integrate with any system...and to protect your investment and television satisfaction against any or all color contingencies.

Anticipating the advent of color, Muntz TV receivers were designed so that a simple Color "jack" is all that is necessary to equip your present set for tandem Muntz Color reception. The enormous Factory Service Operation of Muntz TV, Inc., is geared to thus prepare your set AT NO COST WHATSOEVER the moment you decide to buy a Muntz "Color Companion" unit.

Not an adapter or converter...not a gadget or unwieldy attachment...the new Muntz "Color Companion" is a full sized, full screen Color Receiver to match your present Black-and-White consolette or to "base" your present table model. It will reflect the same calibre performance, high styling and low "Muntz To You" cost that has so successfully characterized Muntz TV since its inception.

Orders for the new Muntz "Color Companion" are being accepted at Muntz "Direct" offices thruout America on a first-come, first-served basis. If you now own a Muntz TV, be among the first to add and enjoy Muntz Color reception. If you do not own a TV receiver now, call now for a demonstration in your home within the hour. There is not the slightest cost or obligation.

*

color color color is HERE coming

Orders for the new Muntz "Color Companion" are being accepted at Muntz "Direct" offices thruout America on a first-come, first-served basis. If you now own a Muntz TV, be among the first to add and enjoy Muntz Color reception. If you do not own a TV receiver now, call now for a demonstration in your home within the hour. There is not the slightest cost or obligation.

*



For your free demonstration call ILlinois 8-6000 IN JERSEY MArket 3-1967

coming with Muntz TV

79-08 NORTHERN BLVD. • JACKSON HEIGHTS, L. I.
817 FULTON ST. • Opposite FOX THEATRE, B'KLYN
89-42 MYRTLE AVE. • RIDGEWOOD, B'KLYN
965 BROAD ST. • NEWARK, N. J.

1151

[fol. 1152] And afterwards on, to wit, the 14th day of February, 1951, nunc pro tunc, November 13, 1950, came the Defendant, F.C.C., by its attorneys and filed in the Clerk's office of said Court its certain Response To Subpoena Duces Tecum and Motion to Quash in words and figures following, to wit:

[fol. 1153] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

RESPONSE TO SUBPOENA DUCES TECUM AND MOTION TO QUASH

Now comes the Federal Communications Commission, defendant in the above-entitled action and in response to a subpoena duces tecum, issued on November 8, 1950 at the behest of the Pilot Radio Corporation, an applicant for intervention as plaintiff, directing the Commission to produce copies of all letters, correspondence and telegrams between the Commission and United States Senator Edwin C. Johnson relating to the subject of color television, states as follows:

(1) Pilot Radio Corporation who has requested the subpoena in question is not a party to this action but merely a petitioner whose request to intervene in the action has not as yet been acted upon. Nor was Pilot a party to the proceedings before the Commission which led to the adoption of the Color Television Order in issue in this case, although it had full opportunity to participate in these proceedings and was on notice to that effect. As more fully set forth in the Commission's brief in opposition to the motion for preliminary injunction at pages 69-73, Pilot is, in any event, completely lacking in standing to complain of the Commission's Order and its petition to intervene in this proceeding must be dismissed for want of jurisdiction.

(2) The request that the Commission bring before this Court all copies of letters, correspondence and telegrams relating to the subject of color television between Senator Johnson and the Commission or any of the individual Commissioners is clearly not filed in good faith or in an effort to aid the Court in the disposition of the real issues in the [fol. 1154] case. The subpoena obviously has been filed for the purposes of publicity and in the hopes of creating by innuendo a completely false suggestion of improper pressure. Pilot has not and could not have adduced any evi-

dence whatsoever showing that the Commission's decision is, in fact, the result of prejudice or of any improper pressure on the part of Senator Johnson or any other person or organization, or that the correspondence between Senator Johnson and the Commission relating to color television, almost all of which has been already made public and given full coverage in the trade press, is in any way improper or prejudicial. It has not made any such allegation in its Motion to Intervene As Plaintiff in this proceeding.

(3) The Commission's decision, which is challenged in this proceeding, is made on the basis of a full administrative hearing, the record of which is before this Court. A trial *de novo* for the purpose of hearing any other testimony would be both improper and unnecessary. The issues presented for determination by this Court, whose inquiry is limited to review of evidence of record before the Commission, may be finally resolved on the motions to dismiss or for summary judgment. See *Columbia Broadcasting Co., Inc.* v. *United States;* 316 U. S. 407. Where the record of the proceedings before the Commission supports its conclusions the court cannot go behind the record and probe into the mental processes by which the Commissioners arrived at their determination. *U. S.* v *Morgan,* 313 U. S. 409, 421-22; *Chicago B & Q Ry. Co.* v. *Babcock,* 204 U. S. 585, 593.

(4) In order to dispel any conceivable idea that anything improper is contained in the correspondence between Senator Johnson and the Federal Communications Commission, there will be produced in Court true copies of all such letters, correspondence and telegrams which the Commission has been able to find in its files or any of the files of the individual Commissioners within the short period of time available since receipt of the subpoena. It is respectfully submitted, however, that there is no basis whatsoever for the subpoena herein requested, and that it should [fol. 1155] be quashed and these documents should not be made part of the record in this proceeding.

Federal Communications Commission, Benedict P. Cottone, General Counsel; Max Goldman, Assistant General Counsel.

[fol. 1156] Acknowledgement of Service

Service of the foregoing "Response to Subpoena Duces Tecum and Motion to Quash" is hereby acknowledged and

a true copy thereof received this day of November, 1950.

Radio Corporation of America, National Broadcasting Company, Inc., RCA Victor Distributing Corporation, Plaintiff; by Kirkland, Fleming, Green, Martin & Ellis, 33 N. LaSalle Street, Chicago 2, Illinois, Counsel for Plaintiffs; Pilot Radio Corporation, Applicant for Intervention; by Schapiro & Schiff, 38 S. Dearborn Street, Chicago, Illinois, Counsel for Applicant for Intervention.

[fol. 1157] And *on*, on the same day, to wit, the 14th day of February, 1951, nunc pro tunc, November 13, 1950, there was filed in the Clerk's office of said Court a certain Affidavit Of Max Goldman, in words and figures following, to wit:

[fol. 1158] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

AFFIDAVIT OF MAX GOLDMAN

STATE OF ILLINOIS,
Cook County, ss:

Max Goldman, being duly sworn, deposes and says:

1. I am Assistant General Counsel in charge of Litigation and Administration, Office of the General Counsel, Federal Communications Commission (hereinafter called "the Commission"), one of the defendants herein, and as such, I am familiar with the proceedings held before the Commission relating to the adoption of standards for commercial color television broadcasting.

2. I have read the complaint, the Government's motions to dismiss the complaint, or in the alternative for summary judgment, the Affidavit of Benedict P. Cottone, dated October 27, 1950, in support of said motions, and I am familiar with the facts stated in that affidavit.

3. This affidavit is made in opposition to plaintiff's motion for a temporary restraining order and a temporary or interlocutory injunction restraining, enjoining, and suspending the promulgation, operation and execution of the Commission's Order adopted October 10, 1950, effective November 20, 1950, promulgating standards for the commercial broadcasting of color television. This affidavit is also made in support of the Government's motions to dismiss

the complaint, or in the alternative for summary judgment.

[fol. 1159] I. *Analysis of Affidavit of C. B. Jolliffe*

4. I have read the affidavit of C. B. Jolliffe, dated November 8, 1950, in support of plaintiffs' motion for a temporary restraining order and a temporary or interlocutory injunction. Said affidavit does not set out any facts tending to establish that plaintiff RCA is threatened with irreparable injury of a type which a court of equity may affort protection against, as a proximate result of the effectiveness of the Commission's Order on and after November 20, 1950, but rather argues matters which were the subject of consideration and decision by the Commission on the basis of the record of the proceedings before the Commission leading to the issuance of said Order. Plaintiff RCA participated fully in these proceedings, was afforded an opportunity to, and did present testimony on all matters pertinent to a determination by the Commission as to whether the public interest would be served by: (1) the adoption of the dot sequential system proposed by RCA, or (2) the field sequential system or (3) any other system proposed in said proceedings, or (4) by a determination that no color television system should be adopted in commercial broadcasting standards. In fact, RCA presented eight witnesses in its behalf in the extensive hearings before the Commission. The names of said witnesses and the transcript page references to their testimony appear as Exhibit B to the First Report of the Commission (Complaint, Exhibit B, pp. B. 98-101). RCA was thus afforded a full opportunity in the proceedings before the Commission to present in its behalf the testimony of any person, including C. B. Jolliffe.

5. The matters set out in paragraphs 8-12, 16-91, 103-158 of the affidavit of C. B. Jolliffe are arguments on matters of fact and policy as to which RCA had a full opportunity to present testimony and proposed findings and conclusions before the Commission, and as to which the Commission made determinations on the basis of the record before it.

6. The matters set out in paragraphs 14, 15, 92-98 of the affidavit of C. B. Jolliffe relate to allegations set out in paragraphs 70-74, and 75(g) of the plaintiff's complaint that a staff engineer of the Commission should not have

[fol. 1160] been permitted to continue in the proceeding after said engineer offered in evidence on the record a device usable with the CBS system. The matters set out by C. B. Jolliffe do not disclose any support for the relevant allegations of the complaint, and these allegations make no substantial claim of legal error by the Commission. The record of the proceedings before the Commission discloses that at no time during the pendency of the proceedings before the Commission did RCA object to the further participation of Mr. Edward Chapin after he introduced in evidence the device which he invented in the course of his duties as Chief of the Commission's Laboratory Division, and the rights to which he assigned to the United States Government. It may be noted that although C. B. Jolliffe states in paragraph 95 of his affidavit as RCA states in paragraph 70 of its Complaint that the device of Mr. Chapin is usable only in the CBS system, the record discloses that Dr. George H. Brown of the RCA Laboratories, testified that the device was usable in other connections, including possible use with the RCA dot sequential system. (R. 7598, 7599, 10757.) The only objection made by RCA on the record was to "putting the development in these proceedings" (R. 5980-5983), and this very objection was characterized by RCA counsel who made it; Mr. McDaniel, as "a matter of appearance more than anything else" (R. 5982). Neither at that time nor at any time thereafter was any objection made by RCA as to the continued participation of Mr. Chapin in the proceedings, although thereafter RCA filed Proposed Findings on June 27, 1950 (R. 15748-15838), Reply to Proposed Findings, on July 10, 1950 (R. 15960-16162), and Comments, on September 29, 1950 (R. 16493-16629), after the issuance of the Commission's First Report. The matters set out in paragraphs 96-98 of the Affidavit of C. B. Jolliffe with respect to the testimony of Chapin for the purpose of showing that he was "predisposed in favor of the CBS system" are argumentative in nature and do not disclose any basis for a claim of bias, even if one had been timely made by RCA. In fact, Chapin was available for cross-examination and was cross-examined by RCA as fully as it desired with respect to the basis for any testimony given by him. (R. 10621-10656, 10669-10671, 10653, 11657-8.)

[fol. 1161] 7. The statements set out in paragraphs 13 and 94 of the affidavit of C. B. Jolliffe with respect to the

number of engineers on the Commission and the dependence of the Commission on industry engineers and staff engineers for technical advice are argumentative with respect to the scheme of regulation and the procedures which have been established by Congress in the communications field. Moreover, the statement in paragraph 13 of the affidavit of C. B. Jolliffe that the two reports of the Commission are based expressly on engineering grounds overlooks the fact that all seven Commissioners unanimously joined in all the technical findings in the Commission's First Report, and in the conclusions based on those findings that the dot sequential system was unsatisfactory and that the field sequential system, in the state of development disclosed by the record, is a satisfactory system.

8. The statements set out in paragraphs 99-102 of the affidavit of C. B. Jolliffe, with respect to the Condon Committee report relate to matters which are outside the record of the proceedings before the Commission. Paragraph 101 discloses that the analysis set out in this report "was based on the testimony given before the Commission during the hearing, the demonstrations before the Commission and certain other demonstrations and tests." It is obvious that a judicial determination as to the reasonableness of the Commission's determination on the record before it cannot be based on matters outside of that record and off the record opinions of others with respect to the evidence which is contained in the record.

9. The foregoing analysis of the Affidavit of C. B. Jolliffe reveals that it makes no showing whatsoever of any kind of irreparable injury to the plaintiff RCA threatened by the effectiveness of the Commission's Order on November 20, 1950. On its face it discloses that (par. 7) "The purpose of this affidavit is to set forth the basic facts and established principles which show that the Order is contrary to the public interest and to set forth the necessary effect of the Order upon the industry and upon research and development." In offering this affidavit of opinions of fact and policy and other matters which are not in [fol. 1162] the record of the proceedings before the Commission, plaintiffs are in effect seeking a trial *de novo* of the Commission's Order on testimony which was not before it, in review proceedings by this Court, whose inquiry

is limited to review of the evidence before the Commission. *National Broadcasting Company* v. *United States*, 319 U. S. 190, 227.

II. *Analysis of Affidavit of Walter A. Buck*

10. I have read the affidavit of Walter A. Buck, dated November 8, 1950, made in support of plaintiffs' motions for a temporary or interlocutory injunction and a temporary restraining order. This affidavit, to the extent that it refrains from re-arguing the merits of the proceedings before the Commission discloses very clearly that the apprehended effect of the Commission's Order depends upon the public's reaction to that Order and to the advertising campaigns of the industry, as well as upon the business judgments which RCA has made and will make in the future.

11. The proceeding before the Commission on the color television issues was instituted by a Notice of Further Proposed Rule Making (Exhibit A of Complaint) released July 11, 1949. Since that date, RCA, as a participant in the proceedings in which it proposed its own color television system, has been aware of the other systems proposed, including the CBS system. If it made plans, in the capacity of a television receiver manufacturer, it should have taken cognizance of the possibility that a system other than its own might be adopted. It now claims that it did not do so, and seeks equitable relief on that basis.

2. The affidavit of Walter A. Buck also clearly reveals that any injury which RCA receives as a manufacturer of receiver equipment depends upon market conditions determined by other factors than the Commission's Order. The effective determinant is the choice made by the public. If the public continues to buy the present type of receiver, RCA is not injured. If the public buys adapters and converters made by other manufacturers, RCA's loss will be due to a competitive disadvantage occasioned by the [fol. 1163] public's choice and its refusal to accede to that choice. The freedom of choice of the public and the opportunity of all manufacturers and sellers of television sets to influence that choice is reflected in the attached photostatic copies of newspaper advertisements by manufacturers and retailers of television receivers. These photostats are true and correct copies of newspaper ad-

vertisements which I have personally read and cut out of the newspapers in which they appeared. They illustrate the freedom of manufacturers and retailers to build and sell receivers of the present type, and to influence the public in its choice. That such influence is used is a convincing demonstration that the matter rests in the hands of the public. The affidavit of Walter A. Buck contains only surmise as to what the public's choice will be. There is no factual showing that the public will not continue to buy RCA receivers. If it does not so continue, any resulting injury will be due to the play of competitive forces. This speculative anticipation of injury is not a showing of substantial threatened legal injury which is the direct result of the Commission's Order.

III. *Analysis of Affidavit of John H. MacDonald*

13. I have read the affidavit of John H. MacDonald, dated November 8, 1950, made in support of plaintiffs' motion for a temporary or interlocutory injunction, and for a temporary restraining order. This affidavit is also largely argumentative in nature with respect to the public interest in the adoption of one of the color television systems proposed to the Commission. To that extent, it is argumentative of the merits, and does not state facts showing irreparable injury. Nor are any facts as to actual injury recited in this affidavit. Such speculative injury as is claimed in the affidavit will not be a direct result of the Commission's Order of October 10, 1950, but will be a result of the public's choice or a competitive disadvantage vis-a-vis other media of advertising. This is not the type of injury which can support either NBC's standing as a party plaintiff or the grant of a temporary restraining order or interlocutory injunction. The claimed fact that NBC has based its future plans on the expectation that a compatible color television system would be adopted is merely a statement of a business judgment made in the [fol. 1164] face of the proceedings before the Commission, at which other systems were proposed. But expectations as to the future cannot constitute the basis for a showing of presently threatened irreparable injury. There is no statement in the affidavit, and none could be reliably made, that the persons who now own sets will not adapt them

if NBC broadcasts in color. Again there is only a guess that the audience will be depleted.

14. Nor is there any requirement in the Commission's Order that NBC or any other licensee broadcast color programs. The assumption made by the affidavit that NBC will lose its television licenses if it fails to broadcast color programs is sheer speculation, and is made with complete disregard of the fact that the Order of October 10, 1950 contains no requirement that any television broadcast station broadcast in color and the further fact that another rule making proceeding, at which NBC could participate, would be necessary before minimum hours for broadcasting in color could be prescribed. It is important to note in this respect that when, in 1941, the Commission first authorized commercial broadcast television transmission, it simultaneously prescribed minimum hours of operation. This has not been done in connection with the adoption of permissive standards for color transmissions.

15. If NBC cannot broadcast in color under the RCA dot sequential system, this has been the case since 1941 when commercial standards for television broadcasting were first instituted. NBC can broadcast on the basis of any system authorized by its license, and the Commission's Rules and Standards. If it cannot broadcast on any other system it desires to, that is the effect of the Communications Act of 1934, particularly Section 301 thereof, 47 U. S. C. Sec. 301.

16. In summation, the claims made in the affidavit of John H. MacDonald on behalf of NBC show no injury, and speculate as to injury flowing from the free action of the public, other television licensees and NBC itself. Such injury is not a legal injury flowing directly from the Commission's Order.

[fol. 1165] IV. *Analysis of Affidavit of Walter M. Norton*

17. I have also read the affidavit of Walter M. Norton, dated November 8, 1950, made in support of plaintiff's motion for a temporary or interlocutory injunction and for a temporary restraining order. This affidavit states no facts within the knowledge of the affiant showing any injury whatsoever to RCA Victor Distributing Corporation proximately threatened by the promulgation of the Commission's Order of October 10, 1950. The allegations

of injury made in the affidavit of Walter M. Norton are merely speculative, and do not recite a single example of threatened actual injury. They are comprised almost entirely of hearsay reports from unspecified persons. The affidavit, instead of reciting factual irreparable injury, speculates as to the future on the basis of hearsay and the affiant's guesses as to the choice which the public will make. In so far as the affidavit may be considered to show any injury, this injury will result from the free forces of competition and the reluctance of RCA Victor to meet the public's preferences, if these do not coincide with the judgments of RCA. Such speculative anticipation of injury flowing from sources other than the direct effect of the Commission's Order itself is not legal injury and is so indirect and consequential that RCA Victor has no standing to maintain this action on the basis of such claimed injury. If this is so, it clearly is not such irreparable legal injury as will support the grant of a temporary restraining order or interlocutory injunction.

18. The photostatic copies of newspaper advertisements by manufacturers and retailers of television receivers, which are attached hereto, clearly show that any possible increase or decrease in the sale of television receivers is dependent upon the free choice of the public, made on the basis of its knowledge of the Commission's decision and such information as manufacturers, sellers of television sets, and others provide.

[fol. 1166] V. *Conclusion*

19. The affidavits in support of plaintiffs' motions for a temporary restraining order or a temporary or interlocutory injunction make out no showing of immediately threatened substantial injury to any present interest entitled to equitable protection, and the grant of an injunction may result in injury to the public interest as found by the Commission in the exercise of its statutory authority under the Communications Act of 1934, 47 U.S.C. § 151 et seq., after a full hearing, in comprehensive findings and conclusions based on the record of that hearing.

(S.) Max Goldman.

Sworn to before me this 11th day of November, 1950.
(S.) Lola E. McElroy, Notary Public. My Commission expires Sept. 13, 1951.

Acknowledgment of Service

Service of the foregoing affidavit is hereby acknowledged this 11th day of November, 1950.

(S.) Andrew E. Hamilton, for Kirkland, Fleming, Martin, Green, and Ellis, Attorneys for Plaintiffs.

George L. Sigel, for Arvey, Hodes & Mantynband, 11/13/50.

(Here follows 4 Photolithographs, side folios 1167, 1168, 1169, 1170-1265.)

Page 764A

Exhibit Not Reproducible

Dynamic's answer to the TV Color Question

As one of America's leading television retailers, with more than 100,000 satisfied customers on our books, and with a strong sense of obligation and responsibility to the public we serve, we take this means of stating our position on the TV color question.

The question uppermost in the minds of most people is: "Will my television set be obsolete when color comes?" Our answer is a positive and emphatic "NO!"

It is Dynamic's firm and considered opinion, based on our own careful analysis and on the judgment of practically every responsible leader in the television industry, that the vast majority of television programs will continue to be broadcast in black and white for many years to come.

Furthermore, the set you now own or intend to buy will receive color, if you so desire, through the use of color converters.

There has been much talk and speculation about the cost of color converters and adapters. Dynamic takes the guesswork out of the color question with this unqualified guarantee to anyone who is thinking of buying a television set at Dynamic Stores:—

DYNAMIC'S UNQUALIFIED OFFER!

BUY YOUR TELEVISION SET NOW!

- DYNAMIC guarantees to furnish you with a color converter and/or adapter as required, when they are available, at a price of **$49.50 OR LESS!**
- This guarantee will be given to you in writing. It applies to all the leading brands of television which we sell in our fifteen stores. These respected brands are listed below.

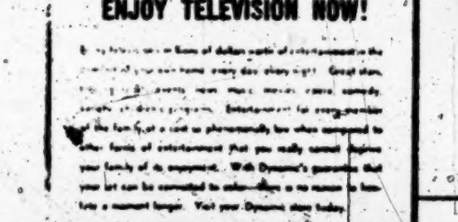
REMEMBER — THE 10% EXCISE TAX ON TV BECOMES EFFECTIVE NOV. 1st

DYNAMIC STORES feature these leading, nationally famous brands of television sets:--

ADMIRAL • ARSLEY • BENDIX • CAPEHART
DeMORT • EMERSON • FREED-EISEMANN
GENERAL ELECTRIC • HALLICRAFTERS
KAYE-HALBERT • MAJESTIC • MOTOROLA
OLYMPIC • PHILCO • RCA VICTOR • SHAW
SENTINEL • STROMBERG-CARLSON • ZENITH

TAKE 65 WEEKS TO PAY

ENJOY TELEVISION NOW!



Dynamic

FREE HOME DEMONSTRATION

For an absolutely free home demonstration of any of the famous television brands listed, call—

STerling 0255

15 GREAT DYNAMIC STORES
In Wash., D. C.—New York—New Jersey—Connecticut

IN WASHINGTON, D.C.

1300 G. STREET N. W.
CORNER 13th STREET

Washington's Music Center for Over 40 Years

Washington Post, October 25, 1950.

OWN A

Motorola

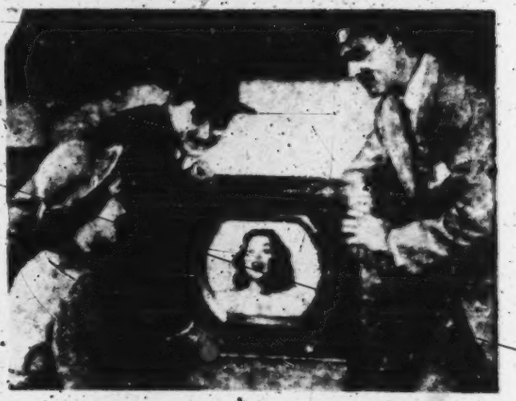
AND YOU KNOW YOU OWN THE BEST

NOW IS THE RIGHT TIME TO BUY TELEVISION

Motorola, leader in television, explains why you should not put off the pleasure of owning television!



Today's TV sets—outstanding performers. You can't make a mistake by buying the 1951 models now on sale. After all, television is no new "gadget." It has been under constant development for the past twenty-five years. The world's foremost scientists have worked to make it perfect. Today's best sets are trouble-free and easy to operate. Pictures are brilliantly clear, sharp and steady. Never before has so little money bought so much wholesome entertainment for all your family to enjoy, where you can really relax—in your home.



What about color TV? The sets you buy today can be converted to receive programs from color stations. You can decide later whether you want to make the conversion when you think there are enough color programs telecast in your community. Meanwhile, you should not miss today's fine programs. And remember that for years to come, the best television entertainment will be only in black and white.



Today's values. TV prices have been drastically reduced each year. Today's higher quality large screen sets cost half as much as two years ago. Television is today's greatest entertainment value! News, drama, comedy, music, sports—Television is your ticket to them all.



Motorola's leadership in cabinet design is recognized with the 1950 Fashion Academy Gold Medal Award. Typical example of Motorola supremacy is this Console Model 19K3. Clear, steady 19" picture, only 2 simple controls, Built-in Antenna, price only $429.95. View it at your dealer's, along with other beautiful Motorola models from $159.95 to $650.00.

Don't wait a day longer—arrange for a Motorola demonstration in your home NOW!



Motorola

TELEVISION

HERE IS AN IMPORTANT MESSAGE FROM

Phillips

ALL TV BUYERS Ought To Know This...

10% TAX ON ALL TV SETS
becomes effective soon!

As one of Washington's largest television retailers, we consider it our duty to inform you of the facts in headline type. You may or may not have noticed small newspaper articles stating that the Government is imposing a tax presently but on all TV sets. We think it only fair to tell you this: If you're buying a TV set within the next few weeks, it will be to your advantage to buy before the new tax becomes law. Of course, if you have not been considering the purchase of TV, don't buy merely to save the tax. We realize that the Government has a very good reason to impose the tax, and we intend to cooperate 100% cheerfully once the tax is in effect. This is merely a friendly notice to the public, particularly those who failed to see the news item publicized recently.

LIBERAL TRADE-IN ALLOWANCE

on this BRAND NEW 1951

Motorola

14" Table Model TELEVISION

A beauty in simplicity and compactness, this stunning Motorola is ideal television for any room. Living room, kitchen, den . . . anywhere in the home, this smartly styled set is instantly ready to bring you hours of pleasant enjoyment. See it now at our nearest PHILLIP'S Store.



IMMEDIATE DELIVERY
at all 3 stores

Phillip's

YOURS FOR THIS LOW, LOW PRICE...

$189.95

817 H St N E

611 7th STREET N W

11th & F Sts N W

1170-1265

[fols. 1266-1420] And afterwards on, to wit, the 14th day of February, 1951, nunc pro tunc, November 14, 1950, there was filed in the Clerk's office of said Court a certain Affidavit of George H. Brown, in words and figures following, to wit:

[fol. 1421] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

AFFIDAVIT OF GEORGE H. BROWN

STATE OF NEW JERSEY,
County of Mercer, ss:

George H. Brown, being duly sworn, deposes and says:

1. In the affidavit of Max Goldman, a lawyer for the Federal Communications Commission, which is dated November 11, 1950, and was filed in the above-entitled action in support of the Government's motion to dismiss the Complaint or for summary judgment herein, the following statement is made:

> "It may be noted that although C. B. Jolliffe states in paragraph 95 of his affidavit, as RCA states in paragraph 70 of its Complaint that the device of Mr. Chapin is useable only in the CBS system, the record discloses that Dr. George H. Brown, of the RCA Laboratories, testified that the device was useable in other connections including possible use with the RCA dot sequential system. (R. 7598, 7599, 10757)"

[fol. 1422] *Affidavit of George H. Brown*

2. Contrary to Mr. Goldman's statement my testimony in the color hearings was not to the effect that the device of Mr. Chapin is useable in other connections, including possible use with the RCA dot sequential system.

3. My reference to the "Chapin converter", on page 7599 of the transcript in the color hearings, was intended as a facetious remark which I made only because it was Mr. Chapin was was questioning me.

4. The device to which this testimony related is not the Chapin device or any variation thereof. The only thing it has in common with the Chapin device is that the device

to which I referred reacts automatically to an incoming signal. That device, unlike that of Mr. Chapin, has nothing to do with changing line and frame frequencies.

5. My reference to the Chapin device at page 10757 of the transcript in the color hearings, was made in connection with testimony about a possible "universal" receiver. This universal receiver would reproduce color pictures from any color signals, whether transmitted by the RCA, CTI or CBS systems.

6. Use of the Chapin device, or one of a similar nature, would be made desirable by the fact that the receiver was intended to operate on CBS signals, and for this reason only. Such a device would have no place in a color receiver designed to work on the RCA and CTI systems only.

7. I agree completely with the statements by Dr. Jolliffe in paragraph 95 of his affidavit of November 8, 1950, and filed in the above-entitled proceedings, to the effect that the Chapin device is usable only with the CBS system.

(S.) George H. Brown.

Sworn and subscribed to before me this 13th day of November, 1950. (S.) Louis J. Rieger, Notary Public, Mercer County, New Jersey. My Commission expires July 9, 1952. (Notarial Seal.)

[fol. 1423] And on the same day, to wit, the 14th day of February, 1951, nunc pro tunc, November 14, 1950, there were filed in the Clerk's office of said Court certain affidavits of Milton Chasin, Frank Perloff, William Blank and Harry Lefkowitz, in words and figures following, to wit:

[fol. 1424] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

AFFIDAVIT OF MILTON CHASIN

STATE OF NEW YORK,
County of New York, ss:

Milton Chasin, being duly sworn, deposes and says:

1. I am President and Treasurer of Bedford Radio Sales and Service, Inc. (hereinafter called "Bedford") whose

principal office is located at 1619 Bedford Avenue, Brooklyn, New York. I am familiar with the sale of television receivers at the retail level.

2. Bedford is engaged and for the past four years has been engaged in the sale to the public of television receivers and other appliances.

3. Bedford has 7 retail stores located throughout the New York Metropolitan Area, presently employs approximately 450 people and its gross sales exceed ten million dollars per year.

4. Bedford sells all the leading makes of television receivers including RCA, Admiral, Dumont, General Electric and Emerson.

[fol. 1425] 5. Since the public announcement of the order of the Federal Communications Commission adopting the CBS incompatible color system, Bedford's volume of orders for television receivers has been substantially reduced to the extent that at present its sales of television receivers are 50% below the volume prior to its announcement.

6. From statements and inquiries received from prospective purchasers, it is evident that the falling off of television receiver sales has been caused by the publication of the order of the Federal Communications Commission and by the public pronouncements of the Columbia Broadcasting System, Inc., promising an incompatible color television service.

7. Many of Bedford's customers have stated that they will not purchase a television receiver at the present time because of the confusion surrounding the availability of color programs.

8. The imminence of the effective date of the Order of the Federal Communications Commission was felt in the sale of television receivers on November 9, November 10 and November 11th when Bedford's sales fell off very sharply. In my opinion if the Commission's Order is put into operation, it will continue to depress the sales of present television receivers.

(S.) Milton Chasin.

Sworn to before me this 13th day of November, 1950. (S.) Adolph Fox, Notary Public, State of New York, No. 03-638500. Commission expires March 30, 1952. (Notarial Seal.)

[fol. 1426] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

AFFIDAVIT OF HARRY LEFKOWITZ

STATE OF NEW YORK,
County of New York, ss:

Harry Lefkowitz, being duly sworn, deposes and says:

1. I am President of The Cortlandt Co. Department Store, Inc. (hereinafter called Cortlandt) located at 243 Broadway, New York, N. Y. I am familiar with the sale of television receivers at the retail level.

2. Cortlandt is engaged and for the past 5 years has been engaged in the sale to the public of television receivers and other major appliances.

3. Cortlandt presently employs approximately 50 people and its gross sales exceed one million dollars per year.

4. Cortlandt sells all the leading makes of television receivers including RCA, Dumont, Admiral, Philco, Emerson and General Electric.

5. Since the public announcement of the order of the Federal Communications Commission adopting the CBS color system, Cortlandt's sales of television receivers have substantially fallen off.

[fol. 1427] 6. During the period October 12, 1950 to October 25, 1950 the sales of television receivers were 70% below the sales effected during the comparable period in September, 1950. During the period October 25, 1950 to November 1, 1950 there was an increase in the sale of television receivers due to the impending Excise Tax. However, from November 1, 1950 down to the present time, Cortlandt's sales of television receivers has fallen off to the extent of 80%.

7. From statements and inquiries received from those prospective purchasers who came into our store, it is evident that the falling off of television receiver sales has been caused by the publication of the order of the Federal Communications Commission and by the various pronouncements of the CBS, Inc. in the newspapers.

8. I have made inquiry of people who have come into our store as to whether or not they had a television set and inquired of those who had responded that they did not have a receiver why they were not purchasing one at pres-

ent. Most of the people to whom I put this inquiry responded that they were postponing their purchase of a television receiver until they were assured that the receiver they purchased would receive all programs broadcasted whether in black and white or in color.

9. With the approach of the effective date of the order of the Federal Communications Commission, Cortlandt's sale of television receivers has sharply declined and in my opinion if the Commission's order becomes effective, the sales of present television receivers will continue to decline.

Harry Lefkowitz.

Sworn to before me this 13th day of November, 1950

Adolph Fox Notary Public State of New York
No. 03-6368500 Commission expires March 30, 1952
(Notarial Seal)

[fol. 1428] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

AFFIDAVIT OF WILLIAM BLANK

STATE OF NEW YORK,
County of New York, ss:

WILLIAM BLANK, being duly sworn, deposes and says:

1. I am President of Baim and Blank, Inc. whose address is 4616 Thirteenth Avenue, Brooklyn, New York. I am familiar with the sale of television receivers at the retail level.

2. Baim and Blank, Inc. have been in the business of retailing major appliances since 1926 and have sold television receivers since 1940. It presently handles all leading makes of television receivers including, RCA Victor, Dumont, Admiral, Philco, Motorola, Zenith and Magnavox. It has in its employ approximately 41 people.

3. Since the public announcement of the order of the Federal Communications Commission adopting the Columbia Broadcasting System color system, the sales of television receivers by Baim and Blank, Inc. have fallen off. [fol. 1429] 4. Since on or about November 1, 1950 the sales of television receivers have fallen off to the extent of

60% from the volume that was obtained during the comparable period in October, 1950.

5. In addition, since the publication of the order of the Federal Communications Commission there has been an alarming falling off of the number of customers entering our store inquiring about television receivers. Many of the prospective customers entering our store have stated that they intend to postpone their purchase of a television receiver until the confusion and uncertainty surrounding color television has been clarified.

6. In my opinion, sales of present television receivers will continue to fall off especially with the continued appearance in the New York newspapers of advertisements and public announcements concerning color television.

7. The sudden and severe falling off of sales of television receivers which my company has experienced, has placed it in an alarming position. The present television receivers which are in stock are not moving and we cannot get and do not expect to be able to get television receivers or equipment which will receive color programs should they be broadcast for the immediate future.

8. At the present time Baim and Blank, Inc. have discharged four employess and should this condition continue, it will be obliged to discharge at least 12 additional employees.

William Blank.

Sworn to before me this 13th day of November, 1950
Adolph Fox Notary Public State of New York
No. 03-6368500 Commission expires March 30, 1952
(Notarial Seal)

[fol. 1430] In the United States District Court

[Title omitted]

Affidavit of Frank Perloff

State of New York
County of New York, ss:

Frank Perloff, being duly sworn, deposes and says:

1. I am President of Friendly Frost Stores (hereinafter called "Frost Stores") whose principal office is located at 82-11 Rockaway Boulevard, Ozone Park, New York. I am

familiar with the sale of television receivers at the retail level.

2. Frost Stores is engaged and for the past five years has been engaged in the sale to the public of television receivers and other major appliances.

[fol. 1431] 3. Frost Stores has 6 stores located throughout the New York Metropolitan Area, presently employs approximately 135 people and its gross sales are in excess of six million dollars per year.

4. Frost Stores sells all the leading makes of television receivers, including RCA, Admiral, DuMont, Philco, Emerson and General Electric.

5. With the public announcement of the order of the Federal Communications Commission adopting the CBS color system, Frost Stores sales of television receivers experienced a sharp decline. During the period October 12, 1950 to October 25, 1950, such sales were 55% below the sales for the comparable period prior to the publication of the above mentioned order. During the period October 25, 1950 to November 1, 1950, there was an increase in the number of sales of television receivers due to the impending Excise Tax. However, since November 1, 1950 to date, the sales of television receivers by Frost Stores have sharply decreased so that at the present time they are 80% below the sales effected for the comparable period prior to the announcement of the above mentioned order.

6. It is evident from statements and inquiries received from people coming into our stores that the falling off of television receiver sales has been due to the publication of the order of the Federal Communications Commission with its promise of a color television service and to the public announcements of the Columbia Broadcasting System, Inc. of its proposed color television programs. Our salesmen have reported that a number of prospective purchasers have decided not to buy a television receiver at the present time and stated that they intend to postpone their purchase until they can be assured that they will have a television receiver that will be capable of receiving all available broadcasts.

Frank Perloff/Pres.

Sworn to before me this 13th day of November, 1950.
Adolph Fox Notary Public, State of New York
No. 03-6368500 Commission Expires March 30, 1952. [Notarial Seal.]

[fols. 1431a-1432] [File endorsement omitted]

[fol. 1433] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

AFFIDAVIT OF J. O. REINECKE—Filed November 13, 1950

STATE OF ILLINOIS,
County of Cook, ss:

J. O. REINECKE, being first duly sworn, deposes and says:

1. I am the operating head and owner of J. O. Reinecke & Associates, Industrial Designers, 720 North Michigan Avenue, Chicago.

2. This affidavit is made with the full knowledge that it will be used in support of the plaintiffs' motion for a temporary restraining order and a temporary injunction, restraining, enjoining and suspending the promulgation, operation and execution of the Order of the Federal Communications Commission adopted October 10, 1950, effective November 20, 1950, providing standards for the commercial broadcasting of color television, and the supporting motions seeking the same relief of Local 1031, International Brotherhood of Electrical Workers, Intervenor, and other intervenors.

3. I have been an industrial designer since 1935. Personally or under my supervision, my organization has designed not less than 5,000 separate products, among them, a wide variety of household products, including cooking utensils, toasters, ranges, refrigerators, radio and television re-
[fol. 1434] ceivers, and other household appliances.

4. I have designed radio receivers for Motorola, Inc., and other companies since 1937, and have designed television receivers for Motorola, Inc. since 1948.

5. In July, 1950, Motorola, Inc. received the Fashion Academy Annual Award for television design.

6. The principal task of an industrial designer in connection with household products, such as radio and television receivers, is to secure a pleasing product design which will be acceptable to large numbers of consumers, but of such character and quality that it can be produced by mass pro-

duction methods. Aesthetic emphasis, however, is the principal concern of the industrial designer.

7. As an industrial designer, I am required to keep constantly aware of what the public will accept or reject in the appearance and design of products offered for retail sale.

8. In connection with my work as a designer of radio and television sets, I have become thoroughly acquainted with current proposals: (a) to adapt and convert existing television receivers for receipt of 405 lines CBS signals in black and white, and for translation of these signals into a color image; and (b) to mass produce new television receivers capable of receiving either standard black and white broadcasts or CBS color broadcasts.

9. In this connection I have read the report of the Federal Communications Commission of September 1, 1950, which is annexed to the complaint of the plaintiffs as Exhibit "B." I have read descriptions of the proposed adapters and converters in the various trade journals of the radio and television industry, and I have seen published pictures of attempted adaptations and conversions, and of models of receivers calculated to house adapter and converter devices in original manufacture.

10. It is my considered judgment that for the reasons outlined below, it will be impossible for any manufacturer to produce adaptation and conversion systems for existing television receivers on a mass production basis.

11. It is also my judgment that it will be physically impossible to incorporate color adaptation and conversion into [fol. 1435] most TV receivers now in use.

12. Also, for the reasons outlined below, it will be difficult to design, for satisfactory mass use, an integral television receiver unit, capable of receiving the CBS proposed 405 line signal, in color, as well as the standard 525 line signal, which is now being commercially broadcast.

13. In the radio and television industry, manufacturers change receiver designs not less than once every year, and most manufacturers change such designs every six months.

14. The smallest of my TV receiver designs which is now in production by Motorola has a tube of 12½ inches. Most of my designs are being produced in connection with 14-inch and 16-inch receiver tubes. The last 7-inch tube design which I made for Motorola was in September, 1948. In May, 1949, I was last retained to design a 10-inch receiver.

These sizes are no longer in production. I can state categorically that a standardization of adaptation and conversion systems on existing television receivers is impossible, not only because of the frequent changes in the physical cabinet design which have been made from time to time by the various manufacturers, but also because of the wide variety of shapes, dimensions, tube positions, knob positions, accessory positions, and utility space positions of the various television receivers.

15. The most difficult task of the designer attempting to create a mass-produced adaptation and color conversion system, is the placement of the color wheel in relationship to the receiving tube. Since this wheel must according to all projections, be not less than twice the size of the tube, the designer is faced with the problem of relating the wheel or disc diameter to all of the external features of the receiver. Thus, on some receivers there are tuning knobs which would either be in the path of the color converter disc or which would be concealed by the disc or its housing. Many receivers have doors which could not be opened or closed across the space which must be allocated to the wheel. Other receivers have space for phonograph or radio mechanism or album storage, which necessarily would conflict with wheel coverage.

[fol. 1436] There has been no standardization of tube location in existing television receivers. Some are at the top of the cabinet. Some are centered on the cabinet. Some are recessed into the cabinet. Others project from the cabinet.

Some cabinets have square corners. Others have rounded corners. In combination sets, the TV viewing tube may be on the left side of the cabinet, or it may be on the right side of the cabinet. The tube may be placed relatively high or relatively low with reference to the top of the cabinet.

16. All of these practical considerations, which involve no aesthetic problems at all, substantiate my conclusion that mass production of a satisfactory conversion and adaptation system to enable existing black and white television receivers to receive the CBS color signal is an impossibility. Such types of receivers as may lend themselves to adaptation (and even according to the FCC, it is admitted that many do not), in my judgment, will require custom installations in plants with facilities therefor.

17. But there are other considerations which dishearten me in my efforts to visualize adaptation and conversion system for existing black and white receivers. No matter how carefully a conscientious designer might attempt to modify or subdue the lines of an external adaptation and conversion system, the size of the color wheel presents an almost insuperable design problem. While it is pointed out that the diameter of the color disc must be more than twice the width of the receiving tube, the total area of the color wheel is much greater than twice the tube area. Thus, for example, a ten-inch tube requires a disc of approximately 23 inches in minimum diameter. While the area of the tube is fifty-two square inches, the area of the color disc would be 415 square inches, or eight times the tube area.

18. It must be borne in mind that television cabinets are purchased by customers and are accepted into the home not only as a medium of entertainment and education, but also [fol. 1437] as furniture. The consumer demands and the TV industry supplies products styled as furniture.

19. The average receiver is kept in an apartment and space limitations are such that the larger percentage of TV users have household space which can accommodate only table models or narrow console models. The appearance of a large exposed disc is not compatible with other home furnishings. It is difficult, if not impossible, to design a large external adaptation and conversion system which will satisfactorily blend harmoniously with the design and styling not only of the television receiver, but of the household furniture. From a design point of view, there is an element of danger in the presence of a high-speed rotating disc which must be considered. Safety precautions dictate the necessity of a shield or housing for the disc. This additionally adds mass and conflicting lines to the original receiver. From a mass production point of view, circular fabrications in wood are more expensive. This would seem to indicate a square shape for the color disc which, of necessity, would involve accommodation for a device having ten times the tube area for color conversion. External housing for a motor of sufficient power to rotate the disc further complicates the design problem by additions of mass and line conflict.

20. Despite its unfeasibility from the design point of view, I will admit that it is possible to custom-make and

accommodate in a home the conversion and adaptation system proposed by CBS on receivers of 7 to 12½ inches in size. However, because of the disc area problems involved, I do not see how it is possible, even on a custom basis, to provide an adaptation and conversion system for a receiver with a tube of 14 inches or larger. The FCC properly suggests that a 26-inch diameter is the largest maximum feasible size for a color wheel. It further suggests that the owners of sets with tubes larger than 12½ inches, can reduce the picture size in order to have full CBS color reception of a 12½ inch picture. I know of no existing techniques whereby the control knobs of present television receivers can be readily used by the home owner to reduce picture sizes. In practice, unless the set owner can install [fol. 1438] a wheel of more than twice the size of the viewing tube, he could not enjoy a CBS TV broadcast, or the new signal in color. This would rule out conversion for all sets now in use which have 14-inch or larger tubes. Such larger units by far constitute the majority of receivers in current use.

21. The comments above relate to attempted adaptation and conversion of existing television receivers to receipt of the proposed CBS color signal. Designing new receivers with so-called "built-in" adaptability and convertibility presents almost equally insuperable problems to an industrial designer. While it would not be impossible to design a television cabinet, incorporating a color wheel, in my judgment, it is impossible to design one which is economical, aesthetically sound and in keeping with good design principles. It is my judgment that the mechanical method of securing color in a television broadcast proposed by CBS and approved by FCC is archaic even before it is introduced.

22. The physical characteristics of the rotating color wheel system of color television viewing imposes limitations in cabinet design which in practice cannot be overcome.

23. The problems of incorporating into a cabinet the color wheel and motor housing necessitates large and cumbersome cabinet accommodations.

24. Viewing tube sizes have increased by popular demand since the introduction of commercial TV broadcasting. There is good reason for such increase in tube sizes.

Larger pictures make for more satisfactory visibility under average seating arrangements. Even if the public demand for larger and yet longer viewing tubes were to be denied by the restrictions of CBS color broadcasting, the design problem is still severe. The cubeage of a TV receiver which would incorporate the adapter and converter system demonstrated by CBS would be about 50% greater than current set sizes.

25. The trend of TV receiver design up to now has been increase of picture size without a proportionate increase in receiver cabinet size. Compactness is the keynote of current product design. Compactness reduces all costs of materials, shipping, handling, delivery, demonstration floor space and the purchaser's housing space which must be allocated to accommodate the receiver. In line with this trend viewing tube manufacturers have reduced tube lengths to permit shallower cabinets. They have also changed over [fols. 1439-1440] from round to rectangular tubes to reduce cabinet sizes.

26. Receivers built to accommodate CBS color broadcasts would be in reverse of the national trend of public desires in receiver equipment. Under the new proposal, larger pictures and greater set compactness would have to yield to smaller pictures on more massive equipment.

J. O. Reinecke.

Subscribed and sworn to before me this 13th day of November, A. D. 1950. Dorothy M. Barbato, Notary Public. [Seal.]

[fol. 1441] In the United States District Court

[Title omitted]

Affidavit of Richard L. Hirsch—Filed November 13, 1950

State of Illinois
County of Cook, ss:

Richard L. Hirsch, being first duly sworn, deposes and says:

1. I am the president of Hudson-Ross, Inc., an Illinois Corporation. I am also a principal stockholder in said corporation.

2. I have read the verified complaint of the plaintiffs in this action and the proposed intervenor's complaint of Local 1031, International Brotherhood of Electrical Workers, AFL.

3. While I have no knowledge of the facts alleged in such complaints which concern the internal operations or problems of the plaintiffs in this action or the labor organization which seeks to intervene, I am familiar with the facts stated in the complaint and in the intervenor's proposed complaint which concern the effects of the FCC Order of October 10, 1950, upon the television industry in general, and I hereby adopt such statements of fact as are therein recited.

4. This Affidavit is made with the full knowledge that it will be presented to the United States District Court for the Northern District of Illinois in support of the motion of the plaintiffs and of the intervenors for a temporary injunction restraining, enjoining and suspending the promulgation, operation and execution of the Order of the FCC adopted October 10, 1950, effective November 20, 1950, providing standards for the commercial broadcasting of color television. This Affidavit is also made in opposition to [fol. 1442] motions to dismiss or for summary judgment filed by the defendants and by the intervenor, Columbia Broadcasting System, Inc.

5. Hudson Ross, Inc., owns and operates three retail establishments in downtown Chicago at which it offers for sale to the general public phonograph records, radio and television receivers. Its stores are located at 101 West Jackson Blvd., 8 E. Randolph St., and 141 S. Wabash Ave. The Corporation and its predecessor partnership has been engaged in the business of retailing such merchandise since 1944. It is presently one of the largest of those business establishments in the City of Chicago which are devoted solely to the retailing of radio and television receivers. The sale of television receivers is, and since 1946 has been, its principal business activity.

6. The gross annual sales of television receivers by Hudson Ross, Inc. in Chicago and vicinity exceed the sum of two million dollars. The corporation has in its employ 150 persons. Of this number, 30 persons are employed as sales personnel, and 50 people are employed in its television and radio service and installation department. Unlike most other retailers of television receivers, Hudson

Ross, Inc. maintains its own service department as an integral phase of its retail business.

7. In the Chicago area, Hudson Ross, Inc. has been a pioneer in the sale of television receivers. It was among the first dealers in the Chicago area who were franchised to retail television receivers when public television broadcasts commenced here in 1946.

8. The corporation, through its retail establishments, sells television receivers manufactured by all of the major producers of such equipment in the field, among them RCA-Victor, Philco, Zenith, General Electric, Westinghouse, Admiral, Sylvania, Motorola, Emerson, Hoffman and Hallicrafters.

9. Either as an employee or owner, this affiant has been connected with establishments engaged in the retail sale of radio receivers since 1926.

10. In 1944 this affiant became a partner in Hudson Ross, and acquired his principal ownership interest therein.

11. Hudson Ross, Inc. has sold in excess of 20,000 television receivers in the Chicago area since 1946. As president of the corporation, this affiant is acquainted with the needs, desires, and expectations of the buying public regarding television receivers, and know intimately the serv-
[fol. 1443] icing and marketing problems connected therewith.

12. Since any and all proceedings and actions of the FCC which bear upon changes in broadcasting standards of radio and television programs affect directly the business of Hudson Ross, Inc., this affiant has examined and studied diligently all such proceedings and actions of this agency. I have read the report of the FCC issued on September 1, 1950, which is attached to the complaint of the plaintiffs herein as Exhibit B, and the FCC Order of October 10, 1950, effective November 20, 1950, concerning the standards of the commercial broadcast of color television. It is my considered judgment that the action of the FCC concerning color television broadcasting standards embodies fundamental error, runs contrary to public interest and convenience, is not based upon public necessity, and seriously jeopardizes the future of the television industry in all its branches, including broadcasting and the manufacture and sale of television receivers.

13. There are not less than six erroneous assumptions

contained in the FCC findings which I shall discuss in order. These errors are:

(a) The assumption that the CBS color system is "compatible" with existing black-and-white receivers,

(b) The assumption that the viewing public will rest content with a smaller television picture, from 7 to 12½ inches, so long as the picture is in color,

(c) The assumption that the owners of the more than nine million television receivers now in use, or any substantial portion of such owners, will freely spend from $95.00 to $170.00 for the adaptation and conversion of existing black-and-white receivers for the reception of the CBS color signal or even a lesser amount to adapt such receivers to receive such color signal in black and white.

(d) The assumption that the viewing public will readily accept and be satisfied with a television picture which is coarser than the black-and-white pictures which are presently available on their receivers.

(e) The assumption that it is possible to design, mass-produce and sell to the viewing public a satisfactory con- [fol. 1444] verter which will make possible the use of existing receivers to receive color signals under the proposed new standards, and

(f) The assumption that the FCC Order will make possible an orderly transition from present methods of television broadcasting and reception to newer and better methods.

Compatibility

14. Hudson Ross, Inc. strives to maintain retail establishments which deal fairly and honestly with customers. There are many other television retailers throughout the nation which are similarly minded.

We have sold in excess of 20,000 television sets since 1946. In connection with such sales we have often been asked by purchasers questions as to the possible obsolescence of such sets by the introduction of color broadcasting. We sought, always, to make frank answers to such inquiries by advising the prospective purchasers that the federal government (meaning the FCC) had already laid down rules which would protect them in the event that color broadcasting should become feasible in the future. We pointed out that the FCC had stated that broadcasting standards,

whether for black and white or color, would "assure to the public in basic outline, a single, uniform system of broadcasting which would enable every transmitting station to serve every receiver within its range". We advised them that the U. S. government (again meaning the FCC) had finally sanctioned commercial television broadcasting on the basis of its many statements that such broadcasting would not be allowed until a single, uniform system for broadcasting had been firmly established. We advised that the FCC had assured the public that it would "not be inflicted with a hodge podge of different television broadcasting and receiving systems". (FCC Report of May 28, 1940, in the matter of Order No. 65, etc., FCC Docket No. 5806). We also directed the purchasers' attention to the high stability of radio broadcasting standards, reminding them that radio receivers purchased in 1922 would still receive all regular broadcasts, despite the tremendous improvements in broadcasting, and receiving equipment. [fol. 1445] In good faith, and based upon statements by the FCC and the Condon Committee, we further answered inquiries regarding color TV by stating to prospective purchasers that the government would sanction color broadcasting only if such broadcasts could be received on present black-and-white receivers with black-and-white signals of even quality with present broadcasting standards, either without modification in such receivers, or with "relatively minor modifications". We know that other retailers in good faith made the same responses to questions of prospective purchasers. We were also able to point out to these prospective purchasers that technicolor pictures were being broadcast and were being received as clear black-and-white pictures.

What the FCC now proposes is utterly at variance with its previously announced standards. By the abrupt reversal of its oft-proclaimed policies, the FCC invites and solicits destruction of public confidence in that portion of the business community which manufactures and retails TV receivers.

CBS color signals could be received as black-and-white pictures on existing receivers only by the expensive rewiring of the receiver circuits, or by attaching an external adapter. When the adaptation is achieved, internally or externally, there would be a degraded 405-line black-and-

white picture in contrast to the 525-line picture which appears from present standard TV black-and-white broadcasts. The FCC suggestion that even on an adaptation from standard black-and-white to CBS black-and-white there is "compatability" between the CBS method and existing black-and-white receivers is without basis. The proposed addition of an even more expensive motor-driven, external converter to translate the CBS signal into a full color picture shows up the emptiness of FCC claims of "compatibility".

The FCC states in its Report of September 1, 1950, which I have read and which appears as Exhibit B of the original complaint in this case, "Since the rotating disc must be placed in front of the cathode-ray tube, some existing receivers with doors or recessed tubes would, in practice, be difficult to convert". Thus, the FCC admits that owners of the most expensive and most desirable TV receivers cannot adapt or convert their instruments for CBS color.

[fol. 1446] As a retailer I know, and I advise the Court, that the higher priced TV receiver models which have been sold to the public in recent years have doors and have recessed tubes as a part of their design. Additionally throughout the country, thousands of combination sets embodying AM and FM radio, phonograph and TV have been manufactured and sold and are still being manufactured and sold. All of these, of necessity, have doors and recessed tubes.

It must be borne in mind that the purchase of a television receiver is a major family investment. Over and above the price of the actual electrical and electronic devices the purchaser is acquiring an article of household furniture. He has paid extra money for improved or advanced models because of the character of the wood, the finish, and the design. The FCC, by its Order, would destroy the substantial investments which were made by these members of the public in the confident expectation that the government agency which regulates the television broadcasting industry, would live up to its promises and its duty to protect their interests. In no aspect can it be reasonably asserted that there is "compatibility" between the CBS proposed system and the existing millions of receivers which are now in the homes of the nation.

Restricted Picture Size

15. By its approval of color television broadcasting standards which would render a maximum picture of 12½ inches, regardless of the tube size, the FCC has demonstrated complete ignorance of all movements in the television market since 1946. Its experts would have done better to have spent an hour on the floor of any retail television establishment in the country than to have indulged in months of guessing and conjecturing as to what the public wants in a TV set. The FCC speaks glibly in its Report of the retail price of adapting and converting an existing 7-inch tube receiver to CBS color. It also speaks of the cost of adapting and converting 10 and 12½-inch sets. The prices quoted by the FCC for such adaptation and conversion of the 10- and 12½-inch sets range from $95.00 to $170.00. No price is quoted for the cost of adapting and converting a 16-inch set to receive a 12½-inch picture.

The FCC apparently does not know that 7-inch sets and 10-inch sets are no longer being manufactured or offered for sale in volume as new merchandise in responsible re- [fol. 1447] tail establishments. The public has long since passed the phase of being satisfied with the mere novelty of having a small action picture available at home. The whole emphasis of our industry has been upon larger and better quality pictures. I do not mean to say that 7-inch sets and 10-inch sets are being destroyed or sold for scrap, but I advise the court that in ordinary retail practice a 7-inch set when offered as a trade-in on a unit of 16 inches or larger, has a trade-in value of about $25.00. When Hudson-Ross receives such sets it may, on occasion, sell them to a retail customer for about $40.00 after reconditioning. This is a break-even price, and such a sale is usually made as an accommodation to a customer who has purchased a large set, but wants a second set for the child's room or similar auxiliary use.

10-inch sets receive a trade-in allowance of about $40.00, and after rehabilitation and under the circumstances described above, have been sold to purchasers of large sets as an auxiliary receiver for about $65.00 after rehabilitation.

The smallest receiver now being offered for sale in our retail outlets is a 12-inch set. This is priced at $129.00, but

is a very slow mover. As recently as June, 1950, in an effort to move excess inventory of 12-inch television receivers, Hudson-Ross and many other major television dealers priced them at $99.00 to overcome buyer resistance. While they sold at this price, there was by no means any stampede.

There are sound reasons for the public indifference to smaller TV receivers. Television viewing has tended to become a major group activity for families and for social gatherings. For group viewing, the smaller sets are not satisfactory. There is less eyestrain in connection with viewing images on the larger tubes than on the smaller tubes. There is greater convenience and more acceptable image quality in the larger sets. The overwhelming majority of receivers being made and sold today are 16 to 19 inches in size, and the buying public is still asking for even larger picture sizes. We have seen demonstrations of sets with tubes from 21 to 30 inches, and it is our firm belief that if the industry will be unmolested by [fol. 1448] arbitrary and unrealistic federal interference, 16-inch sets will represent the smallest unit acceptable to the purchaser of the future.

The following statement appearing in Paragraph 111 of the FCC report of September 1, 1950 has been noted by me with great interest.

> "At the present time, the apparatus in the CBS system is limited to projection receivers or to color pictures (unmagnified) of approximately 12½ inches on a direct view tube in a disc type receiver. The limitation on direct view tubes in disc receivers arises from the fact that the diameter of the disc must be at least twice that of the tube. It is not practical to have a disc much larger than 26 inches in diameter in the home. Receivers can be made with tubes larger than 12½ inches and the full surface of the tube can be utilized to view black and white pictures; the disc folds aside when black and white pictures are being received. For such larger tubes, the picture must be reduced to no more than 12½ inches when a color picture is being viewed."

The FCC should know that on existing black and white receivers larger than 12½ inches in size, there is no ex-

ternal mechanism or control to enable such picture to be reduced by the set user to a size smaller than the receiving tube. FCC thus presents to owners of the majority of the receiving sets of the nation the following choices: (a) installation of color discs more than 26 inches in diameter, a most unfeasible suggestion, (b) use of a smaller wheel which will render a portion of the picture in color and the remainder of it in black and white,—a terribly confusing prospect, or (c) no receipt of the CBS color signal at all, the only likely solution.

The FCC speaks glibly of magnified images, and proposes that the maximum 12½-inch picture under the CBS system could be magnified to 16 inches. Along with other retailers, Hudson-Ross has had its experience with magnifiers. They were a dismal failure. While they enlarged the image, they severely restricted the viewing angle, and in a group of several persons, only the person seated directly in front of the set could view a relatively undistorted picture. The industry itself gave up the magnifier experiment early in the game. The public could not be sold on them again, even at FCC command.

Adaptation and Conversion Costs Are Too High

16. As explained above, no ethical retailer would attempt to persuade the owner of a 7-inch set, currently worth $25.00 to $40.00 in the market, or the owner of a 10-inch set, currently worth $40.00 to $65.00, or of a 12½-inch set, currently selling for $99.00 to $129.00, to spend even the lesser amounts estimated by the FCC to adapt and convert such receivers solely for the purpose of receiving [fol. 1449] the CBS signal. A few gadgeteers might be willing to make this outlay, but by and large the public would resist making such expenditures. The FCC Order would saddle the manufacturers and retailers of TV receivers with an intolerable burden of assuming direct sales responsibility for urging upon the buying public the purchase of equipment and services which had best never been conceived.

Coarseness of New Signal

18. The FCC Order proposed a 405-line transmission in place of the standard 525-line monochrome which is now broadcast in accordance with previously established FCC standards. Picture coarseness, even at the 525-line

level, is one of the most serious problems in the sale and servicing of receivers today. Large sections of the public, when first becoming acquainted with television, have difficulty in accepting the lesser resolution of television pictures which they tend to compare with that which prevails in the theatrical projection of motion pictures. In completion of our service contracts we are frequently faced with calls from recent purchasers who complain of the relatively coarse picture which they are receiving on their present sets. Actually, in most instances, the receiver is rendering optimum performance, but nevertheless the new viewer must become accustomed to the standards. Most often the adjustment is made by teaching him to view the picture from a greater distance, from which the grain of the picture is less obtrusive and less objectionable.

Any further reduction in the standards of picture delineation will inevitably lead to immense public dissatisfaction. The Court can best visualize this problem by examining photographic reproductions in newspapers, particularly the cheaper neighborhood newspapers, which utilize coarse-grain engravings, with the fine-grain photographic reproductions in the better magazines. The difference between these two extremes of photographic reproduction is entirely in the lesser or greater number of lines which enter into the photo-engraving. It is inevitable that the public would resent a drop to CBS standards of picture quality. The "shotgun" wedding ordered by FCC of decreased picture size and decreased delineation is deplorable.

[fol. 1450] *Public Resistance to Non-Integral "Attachments"*

19. In my 24 years in the radio and television retailing industry I have endeavored to sell the products of various manufacturers designed to adapt existing radio sets to supplemental uses. I can report that almost without exception all of these efforts have failed, despite the good intentions of the manufacturers and the retailers, and notwithstanding their conscientious desire to enable the consuming public to enjoy additional pleasures by adapting existing facilities to other uses. Thus, short-wave adapters were not accepted by the public. Similarly, FM adapters were failures. The most successful type of adapter was

the phonograph attachment, but even in this field the public preference by far was against non-integral phonograph attachments or devices. Similar failure may be confidently predicted for the FCC-approved adapters and converters of existing TV receivers to reception of CBS color signal.

There is an even stronger and more cogent reason, however, for my firm conviction that the adapters and converters proposed will not be accepted. As I have noted above, in paragraph 14, in the past the average householder purchased a radio set, and now purchases a television set, as an item of significant household furniture. Its appearance and decor must blend with the other furnishings of the room in which the set is used. This is usually the living room—the place where the family gathers, and in which company is entertained. Although the mechanisms in sets with tubes of the same size are virtually standard from one set to another of the same manufacturer, there exists a wide price range. Variance in the retail prices of such receivers is based upon the quality of the cabinet which houses the electrical and electronic portion of the receiver. In shopping for a television receiver, the average person selects a set of a size, shape, color and design which blends with existing living-room furniture. All of these are matters which receive thorough and solemn consideration by every set purchaser. It is inconceivable to me as a retailer that these aesthetic preferences of the average set purchaser will be readily overcome by any broadcasting feature, however enchanting. It may be stated categorically that the American housewife will not permanently accept the placement of an ugly box in her living room, no [fol. 1451] matter how high the quality of the entertainment which might emanate from that box.

Market Disruptions Created by FCC

20. All of my foregoing observations might be treated merely as criticisms of the CBS proposal. An argument might be made that CBS should, nevertheless, be permitted to go ahead and meet the ultimate doom I so freely predict for its system.

The crisis in our industry is not so patly resolved. The fact is that the public has been victimized by a barrage

of confusing and misleading publicity concerning the possibilities of the early advent of satisfactory color broadcasting. CBS agents, principally its president, Frank Stanton, and one Arthur Godfrey, a CBS entertainer, have used the facilities of that network to advise people to stay out of the television market at the present time. In our daily operations we are meeting increasing consumer resistance and are losing sales. So greatly have color TV claims been exaggerated that present set owners who purchased from us have made service calls because their receivers don't show color pictures they believe are being currently broadcast. Financial institutions and television retailers throughout the country, including Hudson-Ross, hold millions of dollars worth of installment paper whose collection has been seriously jeopardized by the irresponsible Order of the FCC and the ill-considered statements of the agents of CBS.

Hudson-Ross has over two thousand television sets on hand, representing a total investment in excess of $600,000.00, and, like other dealers, is currently taking a "short" position with reference to its inventory because of the unsettled picture in the industry. Should CBS color broadcasts commence, even without a Chicago outlet, the set owners with whom we have dealt in good faith, and who have, in good faith dealt with us, may feel that they have been defrauded of an opportunity to view an available form of entertainment, and will blame the retailer and manufacturer of their receivers for their inability to receive programs in their homes.

[fol. 1452] Certain unethical manufacturers and retailers are currently selling standard black-and-white receivers upon oral, and even advertised, misrepresentations that these sets are readily adaptible and convertible at very modest cost for reception of color television broadcasts. Some manufacturers are installing so-called "jacks" which connect with the audio or sound circuits of the receiver and are labeling these receptacles "for color attachment."

These desperate sales tactics are but minor malpractices of the weak and short-sighted in our industry, to accommodate current sales to the major malpractices which are inherent in the CBS claims of "compatible" color TV

and the FCC's embodiment of such claims into enforcible broadcast standards.

Richard L. Hirsch.

Subscribed and sworn to before me this 13th day of November, 1950. Harold R. Rosenthal, Notary Public. (Seal.)

[fols.1453-1454] In the United States District Court

[Title omitted]

Affidavit of Harold V. Levin—Filed November 13, 1950

State of Illinois,
County of Cook, ss:

1. I am the Secretary-Treasurer of Hudson-Ross, Inc., an Illinois corporation, and a principal shareholder thereof.

2. I became a partner in the predecessor partnership of Hudson-Ross, Inc., in the year 1944.

3. I have read the affidavit of Richard L. Hirsch, President of Hudson-Ross, Inc., and I concur in and adopt all statements contained in said affidavit.

Harold V. Levin.

Subscribed and sworn to before me this 13th day of November, 1950. Harold R. Rosenthal, Notary Public. (Seal.)

[fol. 1455] In the United States District Court

[Title omitted]

Order Granting Leave to Intervene—October 30, 1950

The Columbia Broadcasting System, Inc., having moved for an order granting it leave to intervene in the above-entitled proceeding,

Now, upon reading and filing the notice of motion of Columbia Broadcasting System, Inc., dated the 27th day of October, 1950, and the motion to intervene of Columbia Broadcasting System, Inc., and upon all the papers and

proceedings heretofore had herein, and upon the consent of the attorneys for all the parties hereto, annexed to the moving papers and affixed to the foot of a copy of this order, and upon motion of Arvey, Hodes & Mantynband, Esqs., attorneys for Columbia Broadcasting System, Inc., it is

Ordered, that said motion for leave to intervene be and the same hereby is granted, and it is further

[fols. 1456-1457] Ordered, that Columbia Broadcasting System, Inc. be and the same hereby is made a party defendant in the above-entitled proceeding.

Dated: Oct. 30, 1950.

Philip L. Sullivan.

Consented to: Weymouth Kirkland, by Weymouth Kirkland; Kirkland, Fleming, Green, Martin & Ellis, by Weymouth Kirkland, Attorneys for Radio Corporation of America, National Broadcasting Company, Inc. and RCA-Victor Distributing Corporation, 33 North LaSalle Street, Chicago, Illinois.

Cahill, Gordon, Zachry & Reindel, by John W. Childs, of counsel to Radio Corporation of America, National Broadcasting Company, Inc. and RCA-Victor Distributing Corporation, 63 Wall Street, New York, N. Y.

Attorney General of the United States, by John F. Baecher, Washington, D. C.

United States Attorney for the Northern District of Illinois, by Anthony Scariano, Chicago, Illinois.

Federal Communications Commission, by Max Goldman, Washington, D. C.

[fol. 1458] In the United States District Court

[Title omitted]

Order Granting Leave to Intervene—November 14, 1950

It is ordered by the Court that leave be and it is hereby granted to Wells-Gardner & Co., to intervene herein as plaintiff.

[fol. 1459] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

ORDER GRANTING LEAVE TO INTERVENE—November 14, 1950

It is ordered by the Court that leave be and is hereby granted to Emerson Radio & Phonograph Corp. to intervene herein as party plaintiff.

[fol. 1460] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

ORDER GRANTING LEAVE TO INTERVENE—November 14, 1950

It is ordered by the Court that leave be and is hereby granted to Local 1031 International Brotherhood of Electrical Workers to intervene herein as plaintiff.

[fol. 1461] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

ORDER GRANTING LEAVE TO INTERVENE—November 14, 1950

It is ordered by the Court that leave be and is hereby granted to Pilot Radio Corp. to intervene herein as party plaintiff.

[fol. 1462] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

ORDER GRANTING LEAVE TO INTERVENE—November 14, 1950

It is ordered by the Court that leave be and is hereby granted to Sightmaster Corp., to intervene herein as plaintiff.

[fol. 1463] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

ORDER GRANTING LEAVE TO INTERVENE—November 14, 1950

It is ordered by the Court that leave be and is hereby granted to The Radio Craftsman, Inc., to intervene herein as plaintiff.

[fols. 1464-1465] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

ORDER GRANTING LEAVE TO INTERVENE—November 14, 1950

It is ordered by the Court that leave be and is hereby granted to Television Installation Service Association to intervene herein as plaintiff.

[fol. 1466] IN THE DISTRICT COURT OF THE UNITED STATES

[Title Omitted]

TEMPORARY RESTRAINING ORDER—Filed November 16, 1950

Plaintiffs' motion for an interlocutory injunction and for a temporary restraining order from and after November 20, 1950 in the event the motion for an interlocutory injunction is not determined by that date, which motion has been adopted and joined in by interveners Emerson Radio & Phonograph Corporation, Pilot Radio Corporation, Wells-Gardner & Co., Sightmaster Corporation, The Radio Craftsmen Incorporated, Television Installation Service Association, and Local 1031, International Brotherhood of Electrical Workers, AFL, and defendants' and intervener's (Columbia Broadcasting System, Inc.) motions to dismiss the Complaint, or in the alternative for summary judgment, having come on for hearing before the Court, and the Court not having had sufficient time to consider fully the issues raised and the verified complaints and affidavits filed by the parties, and having determined that irreparable damage will result if the promulgation, operation

and execution of the Order of the Federal Communications Commission adopted October 10, 1950, is not restrained and suspended pending determination of the motion for an interlocutory injunction and the aforesaid motions to dismiss the Complaint, or in the alternative for summary judgment, and the Court having made its Findings of Fact and Conclusions of Law to such effect, it is hereby [fol. 1467] Ordered that the motion for a temporary restraining order, restraining and suspending until further order of this Court the promulgation, operation and execution of the Order of the Federal Communications Commission adopted October 10, 1950, effective November 20, 1950, be and it hereby is granted; and it is further

Ordered that the promulgation, operation and execution of the aforesaid Order of October 10, 1950, be and the same hereby is restrained and suspended pending the further order of this Court.

Enter:

November 16, 1950.

J. Earl Major, Judge of the United States Court of Appeals, Seventh Circuit.

Philip L. Sullivan, Judge of the United States District Court.

Walter J. La Buy, Judge of the United States District Court.

[fol. 1468] IN THE DISTRICT COURT OF THE UNITED STATES

[Title Omitted]

FINDINGS OF FACT AND CONCLUSIONS OF LAW—Filed November 16, 1950

This cause coming on to be heard on the 14th and 15th days of November, 1950, upon a motion of plaintiffs for an interlocutory injunction, and for a temporary restraining order from and after November 20, 1950 in the event the motion for an interlocutory injunction is not determined by that date, which motion has been adopted and joined in by interveners Emerson Radio & Phonograph Corporation, Pilot Radio Corporation, Wells-Gardner & Co., Sight-

master Corporation, The Radio Craftsmen Incorporated, Television Installation Service Association, and Local 1031, International Brotherhood of Electrical Workers, AFL, and upon motions by defendants and the intervener, Columbia Broadcasting System, Inc. to dismiss the Complaint, or in the alternative for summary judgment, before the Honorable J. Earl Major, Chief Judge of the United States Court of Appeals, Seventh Circuit, and the Honorable Philip L. Sullivan and Walter J. La Buy, Judges of the District Court of the United States for the Northern District of Illinois, Eastern Division, and upon all pleadings, affidavits and documents filed by the parties and upon consideration thereof and of the arguments of counsel for the respective parties, the Court, being advised in the premises, hereby makes the following Findings of Fact and Conclusions of Law:

[fol. 1469] FINDINGS OF FACT

1. The Federal Communications Commission (hereinafter called the Commission) on October 10, 1950 adopted an Order amending the Commission's "Standards of Good Engineering Practice Concerning Television Broadcast Stations". The order adopted the color television system of the intervener, Columbia Broadcasting System, Inc., and precludes the transmission of the color television system proposed by plaintiff Radio Corporation of America and of all other proposed systems other than the one adopted.

2. The Order, to become effective on November 20, 1950, provides for the commercial broadcasting of color television on standards which are different from the existing standards for the commercial broadcasting of black and white television, which have been in effect since 1941.

3. There are now in the hands of the public approximately 9,000,000 black and white television receivers, none of which can receive any programs broadcast in accordance with the new standards promulgated by the Order.

4. To protect the service which they have been getting, the owners of these 9,000,000 black and white television receivers would have to spend millions of dollars in order to adapt their sets to receive programs broadcast on the new standards.

5. After such adaptation, programs broadcast under the new standards would be received only as a black and white picture having less than one-half the picture detail of the existing black and white service.

6. For the public to both adapt and convert the existing 9,000,000 television receivers so that they would receive in color the programs broadcast in accordance with the new standards would cost many more millions of dollars.

7. Plaintiffs, on October 17, 1950, brought this action to enjoin, set aside, annul and suspend the Commission's Order of October 10, 1950.

[fol. 1470] 8. Plaintiffs have moved for an interlocutory injunction to restrain and suspend the promulgation, operation and execution of the Order, and for a temporary restraining order from and after November 20, 1950, in the event the motion for an interlocutory injunction is not determined by that date.

9. The pending action in which this motion is made has been brought pursuant to the provisions of Section 402(a) of the Communications Act of 1934, as amended (47 U.S.C. Sec. 402(a)) and of Title 28, United States Code (28 U.S.C. Sec. 1336, 1398, 2284, 2321-25), and of Section 10 of the Administrative Procedure Act (60 Stat. 243; 5 U.S.C. Sec. 1009), providing for the judicial review of orders of the Commission of the kind here involved, and for the issuance of temporary relief against injury caused thereby.

10. Plaintiffs' motion for an interlocutory injunction and for a temporary restraining order has been adopted and joined in by all parties who have intervened seeking to vacate, set aside, suspend and annul the Commission's Order of October 10, 1950.

11. The Court, while having been advised in the premises, has not had sufficient time to consider fully the issues raised by the verified complaints and the affidavits filed by the parties prior to November 20, 1950, the effective date of the Commission's Order.

12. The plaintiffs and interveners, representing manufacturers, employees, a distributor, a television broadcaster, a proponent of a color television system, set owners and television servicemen will suffer irreparable damage if the Commission's Order is not restrained or suspended during the consideration and determination of the action for an interlocutory injunction, by virtue of the impairment of the

market acceptance of present television receivers and by virtue of the inability of present television receivers to receive any broadcast on the standards adopted by the [fol. 1471-1472] Order without substantial expenditures which may prove to be useless. The foregoing is shown by: the affidavits of C. B. Jolliffe, sworn to on November 8, 1950; Walter A. Buck, sworn to on November 8, 1950; John H. MacDonald, sworn to on November 8, 1950; Walter H. Norton, sworn to on November 9, 1950; Richard L. Hirsch, sworn to on November 13, 1950; Harold V. Levin, sworn to on November 13, 1950; and J. O. Reinecke, sworn to on November 13, 1950; the verified Complaints of Emerson Radio & Phonograph Corporation, Wells-Gardner & Co., The Radio Craftsmen Incorporated, Television Installation Service Association, and Local 1031, International Brotherhood of Electrical Workers, AFL; and all other affidavits submitted in this action.

13. The temporary suspension of the aforesaid Order of the Federal Communications Commission pending a determination of the aforesaid motion for an interlocutory injunction will be in the public interest.

Conclusions of Law

Plaintiffs' motion for a temporary restraining order restraining and suspending until further order of this Court, the promulgation, operation and execution of the Order of the Federal Communications Commission adopted October 10, 1950, effective November 20, 1950, should be granted.

Enter:

November 16, 1950.

J. Earl Major, Judge of the United States Court of Appeals, Seventh Circuit.

Philip L. Sullivan, Judge of the United States District Court.

Walter J. La Buy, Judge of the United States District Court.

[fol. 1473] IN UNITED STATES DISTRICT COURT

[Title Omitted]

AFFIDAVIT OF ISIDOR GOLDBERG—Filed November 20, 1950

STATE OF NEW YORK,
County of New York, ss:

Isidor Goldberg, being duly sworn, deposes and says:

I am the President of Pilot Radio Corporation, one of the intervening plaintiffs in the above entitled action.

Heretofore and on or about November 8, 1950 there was issued out of this Court two subpoenas duces tecum, one addressed to Columbia Broadcasting System, Inc. (the intervening defendant) and the other addressed to the Federal Communications Commission, asking that they each produce at the hearing before this Court on November 14, 1950, certain letters, documents, correspondence, etc., more fully set forth in the said subpoenas. The originals of these subpoenas together with proofs of service thereof will be filed concurrently with the filing of this affidavit.

[fol. 1474] I am advised that on the argument of the plaintiffs' motion for a stay and for a temporary injunction and in opposition to the defendants' motion to dismiss the complaint or for summary judgment, counsel for Pilot Radio Corporation, intervening plaintiff, called to the Court's attention certain correspondence that had been exchanged between Senator Edwin C. Johnson, Chairman of the Senate Interstate and Foreign Commerce Committee, and the FCC or members of the FCC, and certain additional correspondence that had been exchanged between Senator Johnson and the intervening defendant, Columbia Broadcasting System, or officers of this company. There was also called to the Court's attention certain public addresses made by Senator Johnson in connection with the Commission's activities and its consideration of color television, more particularly, two addresses made in the Senate on April 20, 1949, and on February 16, 1950.

I am also advised that upon the argument by counsel for the intervening plaintiff, Pilot Radio Corporation, the Court's attention was called to the following facts:

First, that subpoenas had been issued addressed to the FCC and CBS, as hereinbefore set forth.

Second, that following the issuance of these subpoenas, Senator Johnson on November 9, 1950, addressed telegrams to Chairman Coy and to CBS reading as follows:

[fol. 1475] "According to the press, Pilot Radio Corporation has had subpoenas served on the FCC and CBS asking them to produce all correspondence and other communications they have had with me on color TV. I hope that every shred of correspondence between me and the FCC and CBS will be made a matter of public record. I have nothing to hide and I have nothing to cover up. I am sure that any correspondence will only go to show that my sole interest has been to see that the public is not denied color television. In addition, I believe it would be well for Pilot Radio Corp. to make full disclosure of meetings, correspondence and understandings between them and other TV manufacturers in relation to color TV.

(S.) Edwin C. Johnson,
Chairman Senate Interstate and Foreign Commerce Committee."

Third, that when the substance of the foregoing telegram was made public and appeared in the press, Pilot Radio Corporation addressed the following telegram to Senator Johnson on November 10, 1950:

"Note your statement that your relationship with CBS and FCC is an open book. Would be in the public interest for you to state why you have stepped outside the legislative role in this controversy and cajoled, prodded and even demanded that the FCC approve a color system which not only fails to meet fundamental principles, standards and criteria previously laid down by FCC, but which is almost universally disapproved by electronic engineers throughout the country. Would be in the public interest for you to state if you deem it proper in your capacity as Chairman of the Senate Commerce Committee, which passes on FCC appointments and influences appropriations, to have stated fourteen months before CBS color was approved, i.e., as far back as August 1949, after witnessing a CBS color demonstration, that 'color is here now'. Was it proper for you to state that FCC reluctance to then approved CBS color was a 'road block'

and 'contrary to the laws of progress'? Was it proper at that time for you to accuse the FCC of 'reasoning . . . logical in a totalitarian . . . state'? Would also be in the public interest for you to state your qualifications which enable you to set your judgment against [fol. 1476] that of trained engineers. For your information we started our suit without any cooperation with the television industry and have acted entirely on our own initiative against an unwise FCC decision. Our only interest is to insure that the public have the benefit of the best color system obtainable in the forseeable future, regardless of whose system it may be. We object to having foisted upon the present nine million television set owners needless and wasteful expenditures. It is for that reason alone that we are independently carrying on our fight against the unwise order of the FCC. Attorneys for CBS have just notified our attorneys that they will not disclose their correspondence with you until the Court hearing on the 14th. Request that you make same public at once.

(S.) Isidor Goldberg,
President, Pilot Radio Corporation."

Fourth, that thereafter, on the eve of the argument before this Court, that is, at 4:20 P.M., November 13, 1950, the following telegram was received by me from Senator Johnson:

"I am gratified to know of your purported concern for the public interest. In due course it is likely that those believed to be conspirators will be called before this Committee and given an opportunity to prove the other allegations contained in your telegram. No one who has a genuine concern that only the public interests be served will have any difficulty working with the Senate Committee on Interstate & Foreign Commerce. All Actions by this Committee in the past and in the future have been and will be governed by that standard alone.

(S.) Ed. C. Johnson,
Chairman, Senate Committee on Interstate & Foreign Commerce."

All of the foregoing was in good faith called to the attention of the Court because the same was deemed relevant and pertinent to the determination of the issues before the Court. In this connection, reference is made to the brief submitted on behalf of Pilot Radio Corporation, which [fol. 1477] among other things, points out that the "prodding, cajoling and demands" of Senator Johnson upon the FCC could only have had the effect of influencing that body in making a decision favorable to the CBS color system, and thereby explain an otherwise inexplicable decision by the Commission. Counsel for the FCC in its motion to quash the subpoena addressed to the FCC states that Pilot could not have adduced any evidence showing that the Commission's decision is the result of improper pressure on the part of Senator Johnson or that the correspondence between Senator Johnson and the Commission relating to color television is in any way improper or prejudicial. Such correspondence speaks for itself. Accordingly, the defendant should have no objection to the submission of the same to the Court for the Court's consideration and evaluation thereof in the light of all of the circumstances.

Pursuant to the subpoenas duces tecum referred to above, the defendants, FCC and CBS, produced in Court what purports to be copies of all letters, correspondence and telegrams between the Commission and Senator Johnson and the Commission, CBS and Senator Johnson. In addition to the correspondence, addresses and telegrams referred to above, there is attached hereto such additional communications from the aforesaid files submitted pursuant to the said subpoenas as counsel deemed pertinent in his inspection thereof.

The files in question of the Federal Communications Commission and of CBS are before the Court. Only the FCC has moved to keep out of the record the documents [fol. 1478] produced by it. It is respectfully requested that said motion of the defendant, FCC, be denied and that there be placed in evidence and made a part of the record in this case, or in the alternative that the Court take judicial notice of, each of the documents hereto attached and made part hereof and each of the telegrams set forth in the body of this affidavit.

(S.) Isidor Goldberg.

Sworn to before me this 17th day of November, 1950. Jerome S. Zurkow, Notary Public, State of New York, No. 24-4400350. Qualified in Kings County. Cert. filed with N. Y. Co. Clk. and Reg. Term expires March 30, 1951. (Seal.)

[fol. 1479] Copy

August 25, 1949.

Honorable Edwin C. Johnson, Chairman, Committee on Interstate and Foreign Commerce, U. S. Senate, Washington, D. C.

My Dear Mr. Chairman:

This is with reference to your letter of August 22, 1949, and the letter of Commissioner Jones of August 17, 1949, to Dr. Frank Stanton concerning the alleged attitude of radio manufacturers with respect to the building of color television converters for black and white receiving sets or for color receiving sets.

Until your letter was received, the Commission was not aware of Commissioner Jones' letter to Dr. Stanton nor of the statements referred to therein to the effect that radio manufacturers will not build color television converters. The Commission is equally concerned as to the implications of the alleged attitude of the radio manufacturers and has taken prompt steps to determine all the facts with respect to this matter.

Sincerely (S.) Paul A. Walker, Acting Chairman.

JNN:BPC/fmp.

Signed by above Initialed "J. H." Mailed by Aug. 25, 1949. Mail & Files. 8736-18.

[fol. 1480] United States Senate

Committee on Interstate and Foreign Commerce

Original File "CBG"

Received, Aug. 9, 1950. Federal Communications Commission.

August 4, 1950.

Dear Mr. Chairman:

We have noted with great interest copies of letters sent you during the last two days from two of the leaders in

the television industry with respect to the pending color television decision. We presume these letters grow out of the current rumors and intimations in the trade press that a final and conclusive decision is to be postponed indefinitely, using the war as an alibi. We put little credence in these incredible fears.

These letters from the Columbia Broadcasting System and the Radio Corporation prove conclusively once and for all that the selfish interest conspiring for delays are not the pioneers who have fought the hard battle in the laboratory and expended millions of dollars to make this amazing recreational and educational development available now to the American people.

On the other hand, busy-body scandal mongers are spreading these stories for a wicked purpose and obviously not in the public interest. They ignore the nine months of tedious, detailed, and searching hearings only recently completed—the most intensive ever held by an administrative agency. They forget the time and money spent by CTI, RCA and CBS in presenting their cases. They overlook the patience, the continuous attendance, and the intense study and concentration which each commissioner has given the mass of testimony which was presented in the tense atmosphere of good American rivalry and free enterprise competition. They overlook, too, the fact that this vital matter has been before the Commission for almost a full decade. Any further delay will place us far behind the rest of the world in this potentially phenomenal improvement of the television art.

Most certainly, the Commission now has before it all of the basic and scientific facts which can be presented. The eminent and unbiased committee of scientists, popularly known as the Condon Committee, has declared unequivocally that color television is ready now. Every member of the Senate is receiving a copy of the Condon report with a covering letter from me calling attention to its findings. Already, more than 1,100 copies have been sold by the Government Printing Office and Senators are requesting more and more copies for their constituents.

The employment of the current Korean crisis as an alibi for delay by the detractors of color television shows how desperate they are for any excuse for procrastina-

tion, deferment, or weasely worded proposed findings which would have the deadly effect of delay itself. When [fol. 1481] delay is the objective, of course any expedient will serve the purpose but it is wholly unrealistic for these selfish interests to seize upon the war needs as an excuse; it indicates an utter lack of appreciation of the important part played by electronics in modern war. The immediate commercial utilization of color television could be a vast aid to the defense effort in testing jet engine flame colors, observation of guided missiles, surveillance of various atomic processes, and in a number of other still secret processes and developments. Whether or not the Korean conflict, or even a major expansion of it, would seriously affect production in the electronics industry is beside the point. Korea is not part of the testimony in the record and even if it were honestly believed that a decision for immediate utilization of color could not be put into effect because of the war, the commission has no duty or responsibility or even right to use such an anticipated development as a prop for "no decision now," or for a proposed or tentative decision, or for anything other than a clearcut definitive decision based on the record before it. I am certain that you will agree that to do otherwise would subject the commissioners to the sharpest criticism.

However, I find it hard to believe such expediencies will be resorted to when I recall that the two most recent commissioners to appear before us for confirmation, Messrs. Webster and Sterling, are firmly on the record as favoring a quick and positive decision on color television; in fact, they took considerable credit personally for "pushing" their colleagues into doing something about color. The viewpoint of at least two other commissioners with respect to the advisability of a speedy and definitive color decision which would authorize immediate operation on existing channels is well known. I have such confidence in your common sense, responsibility to duty, appreciation for effective public relations, and deep concern for the general public interest that I have no qualms about your personal position. Therefore it is obvious that at least a majority believes that a decision *now* would in no way prevent future development of improvements in color which could and would be made as experience is gained from actual operation in the present TV band.

Consequently, I am grateful to the present commissioners for their constructive approach to the imperative need for speeding the commercial operation of color television. I know the devious character of the opponents. They have tried to bring pressure on Congress also. They will not hesitate to confuse the issue, spread false rumors and even attempt to induce commissioners to postpone, equivocate or hedge.

You know my deep concern over the color question but I am equally as concerned over the standing and stature of the Commission with the Congress and the public generally. Everyone realizes that the Commission is itself before the bar of public opinion in this matter.

[fol. 1482] In any event, I want it on the record now in advance that I have been in this campaign too long to surrender without a struggle. If there is any temporizing with a clear cut decision now, the fight must go on until the American people enjoy the beneficient gift which science already has brought out of the laboratory.

I feel so strongly about this entire matter that it seemed wise to write you as I do. With my warmest personal regards, I am

Very sincerely yours,

(S.) Ed. C. Johnson, Chairman.

ECJ:Cms

Hon. Wayne Coy, Chairman, Federal Communications Commission, Washington, D. C.

[fol. 1483] Copy

August 5, 1950.

Dear Ed:

I want to tell you how much I enjoyed our visit Thursday evening and thank you as well for the dinner.

I am enclosing an approximate copy of the picture I sent to Ed Craney. I had an extra one made at the time so I could experiment with it. Obviously, this is the one I didn't send, but I thought you might be interested in the gag.

As a result of our talk about the northwest, I can hardly wait to get back out again.

With all good wishes.

Cordially,

(S.) Frank Stanton.

ww

Mr. Edward Cooper, Committee on Interstate and Foreign Commerce, United States Senate, Washington, D. C.

[fol. 1484] Copy

United States Senate

Committee on Interstate and Foreign Commerce

Tuesday, 8 Aug. 50.

DEAR FRANK:

You are very thoughtful to send me the snaps. The Butte man in front of the restaurant is Al Shone, the man I mentioned when you were here. He is quite a character—garrulous, loud and extrovert. I have played cards (pangini) with him on many occasions. Marg (my wife) will be pleased with the pix—and incidentally they are excellent, you are obviously a first class photographer.

I noted the piece in the Sunday NY Times Magazine and was struck by the Baruch and Swope picture after our talk earlier this week.

I enjoyed the picture of Craney's billboard and am going to keep it.

How did you like the Senator's letter? It went into the Cong. Record today and we have released mimeographed copies—Earl got several and apparently will send some up to New York. I wonder what Wayne's reaction is. I hope he realizes that the letter was intended to strengthen his own position.

Again, many thanks for remembering me with the pix. If we get home this fall I'll give McShane the best regards of the Stantons.

Sincerely,

(S.) Edw.Cooper.

Original is handwritten.

Portion underscored is also underscored in Red Pencil.

[fol. 1485] Copy

United States Senate

Committee on Interstate and Foreign Commerce

June 22, 1950.

My Dear Mr. Commissioner:

I read with considerable interest your speech of June 19 before the American Taxicab Association, and particularly the third paragraph. There is something peculiar about that paragraph; it does not seem to fit into the remainder of the speech. Its content is remote from the subject matter being discussed.

Upon inquiry by the press earlier this week for comment on the speech I said: "Commissioner Webster could not have been referring to me since he said, '. . . those . . . who do not have any responsibility under the Communications Act.'" Of course, I need not remind you that under the Congressional Reorganization Act "each standing committee . . . shall exercise continuous watchfulness of the execution by the administrative agencies concerned of any laws, the subject matter of which is within the jurisdiction of such committee. . . ."

I did discuss with a group of television producers some weeks ago a possible timetable of Commission action on television decisions. The information I gave them at that time was procured from Chairman Coy, who was advised that these people were about to importune me to intercede in lifting the freeze and that I was most anxious to prove to them that not only was the Commission proceeding expeditiously and in the public interest and had my commendation for their work, but that it was proceeding in the only proper and logical manner. As far back as last April, Chairman Coy told the NAB convention in Chicago that he hoped that the freeze would be over by the end of the year, or earlier. Last month, he again in his Denver and Chicago speeches discussed the timetable of action by the Commission. Only last week, Commissioner George Sterling, testifying before our committee, gave us a similar timeable. These facts are called to your attention to refresh your recollection that all of the recent references to the Commission's timetable on television have come from

persons who *do* have a responsibility under the Communications Act.

As to the "capabilities of the individual commissioners and the staff to digest the record, etc.", I can readily appreciate your concern with respect to one of the commissioners and I assure you it is shared by many.

Very truly yours,

(S.) Ed. C. Johnson, Chairman.

Hon. Edward M. Webster, Commissioner, Federal Communications Commission, Washington, D. C.

[fol. 1486] April 20, 1949.

Address of Hon. Edwin C. Johnson (D., Colo.). In the Senate of the United States for Release upon Delivery.

A Report on Communications

By U. S. Senator Edwin C. Johnson (Colo.)

In this not-so-brave new world communications have played and ever increasing vital role. Indispensable in war, powerful instrument of peace, this art has served tyranny and democracy alike. From the crude tom-tom of the jungle to miraculous radar, communications have marked the progress of man. Realizing its power for good and for evil, Congress created the Federal Communications Commission to promote the development of communications and to protect the people against monopoly and the exploitation inherent in an industry requiring regulation.

By specific law it is the duty of the Interstate and Foreign Commerce Committee to supervise the Commission's actions and conduct. Therefore, it would be nothing short of dereliction of duty, if I did not report candidly the deplorable conditions which I have found prevail in this independent quasi-judicial and quasi-legislative agency of our Government. I have waited until I had an opportunity to probe and double check the patent situation before making this report on communications to Congress. Now with deep reluctance I shall undertake this unpleasant duty.

It is not an exaggeration to say that the Commission's functions are more precious to this Republic than gold and more vital to it than bread. Its power to destroy the

soul of America is far greater than 300 divisions of armed men under the direction of a ruthless foe. On the other hand its potential to bless America equals, if it does not surpass, our vast educational system of public schools. With firm determination the Congress must seriously contemplate these sobering thoughts.

As conditions in this agency of Government have grown from bad to worse, I feel compelled to employe the harsh method of a public denouncement of the evils which have grown up. To remain silent longer would reflect on my integrity and demonstrate my failure to be alert in the protection of the people's interest.

Individually the members of the Commission are persons of highest character and integrity. Taken one by one, each has superior qualities for the common task. I have voted for the confirmation of every Commissioner now serving because I believed each possessed the capacity to do an outstanding job. I would not change one of those votes today. Yet strangely enough, as a body exercising vital quasi-judicial and quasi-legislative functions they have failed utterly in protecting the people against monopolistic exploitation by not blocking the plans of the conniving clear channel lobby bent on radio domination; by not moving promptly to correct the Commission's earlier error in adopting a narrow television system which insured the control of television in a few patent holding corporations; and by not formulating a television plan which would guarantee the widest and freest competition.

I want to make it crystal clear that I believe in the American private enterprise system without reservation; I believe in the minimum of government controls consistent with maintaining and promoting the general welfare; I believe that the greatest good to the greatest number will result from free and vigorous competition, and that it is the duty of the Government to prevent monopoly and root it out wherever it appears. In radio, and particularly in television, the people of the United States and the world are dealing with the most powerful and effective propaganda medium ever known to man. I do not want that medium to fall into Government ownership; neither do I want it to fall into the hands of private monopoly. Free and unhampered competition is the answer. Therefore, my primary objective in everything I say today is to promote the widest and strongest competition in its development and use. Radio

and television are *not* a complicated, involved technical matter which laymen can complacently dismiss as an engineering problem. In fact, this very idea of complexity and confusion and technical abtruseness has been sown in the Congress and spread deliberately both within and outside the Commission to shut out prying minds. Every member of Congress can understand it once it is stripped of its technical jargon and deliberately distorted complexities. Simply put, a series of basic policy decisions and alert, industrious and honest administration are all that is required. Most emphatically, I say that we had better seek to understand it lest by complacency we allow an anti-democratic system to grow into a Frankenstein.

[fol. 1487] *Industry Takes Over*

Specifically, it is charged that the bewildered commissioners, bogged down in the technicalities and red tape of their own creation, are the captives of their own staff and that their own staff, in turn, is the captive of the high and the mighty in the very industry the Commission was created to regulate. The plow horse has usurped the plow handles and seized the whip and the Commission is now pulling the plow. Mr. President, This is a shocking indictment, but there is abundant evidence that it is true.

Cases Collect Dust

It is charged that awaiting decision by the Commission is a huge backlog of cases important to the people of this nation, many of which have been collecting dust down there two and three years with little or no prospect of action. Apparently, Mr. President, no one disputes that serious charge. In fact the staff boasts about it and cites it as evidence that an even larger staff is needed. In my opinion, under the present setup a larger staff would result only in more finagling and wrangling and fewer decisions. It is easier to drive a camel through the eye of a needle than it is to get a decision out of the Federal Communications Commission.

Premeditated Delays Wicked

It is charged that through the Commission's failure to make decisions great harm has been done not only to individuals but to whole communities. It is charged that

there are private interests who thrive on inaction and reap a profit out of the organized and premeditated delays which harass alert citizens planning improved service for the people. Certainly, Mr. President, in many instances failure to take any action is far more deadly and disasterous than an *adverse* action might be. When pending matters are delayed year after year the Commission's victims are tied up without recourse. They can make no plans for the future and they cannot go to the courts for relief.

Fear Rides the Ether

It is charged that the communications industry operates in an atmosphere of fear of the Commission. It is charged there is an even greater fear that the networks and the powerful manufacturing and patent holding interests, working hand in glove with the Commission, can and do exact their own economic sanctions. Mr. President. At least fear is an understatement in this case. There is genuine fear an ng the two thousand small and medium radio broadcasters in this country. In fact no one in the industry is free from it. Nothing behind the iron curtain compares with it except that in Russia physical punishment is invoked; over here the penalty is the threat of financial ruin. Under the law the Commission holds the power of life or death over radio broadcasters.

Less Speeches and More Work

It is charged that absenteeism within the Commission has reached an alarming stage and that when the Chairman is not making a speech in some near or distant city he is busy preparing one. Mr. President. One Commissioner has been in Mexico City since early last Fall in an international conference on the use of short wave. The Chairman and another Commissioner are taking their shots preparatory to a long international conference in Paris.

Doubtless the Chairman of this Commission is besieged with requests for public appearances in connection with matters concerning the industry. It is well that he exercises as much reserve as he does but it would be better if he made no speeches at all, particularly when they vary from week to week depending on specific influences at work. In Baltimore on March 23, he told the Advertising [fol. 1488] Club that television service as now set-up is

potentially capable of serving many millions of people; that in most areas technical transmission is satisfactory; that the problem of obsolescense of receiving sets is relatively minor since the present channels will be used for the indefinite future; that if he lived in Baltimore, he "would not wait until the FCC had decided what they are going to do about UHF"; and that he "would not wait until some bureaucratic agency decided whether there was sufficient propagation data available to write new standards". It is obvious he spoke thus to placate receiver manufacturers and to restore confidence in the minds of the cautious prospective buyers of sets.

But last week, speaking before the National Association of Broadcasters in Chicago, he emphasized that the public interest must come first; that the new Ultra High frequencies will be opened up in a few months; that "imaginative leadership rather than the Maginot Line type" is needed to bring television service to all of America; that costs of equipment must be reduced so that many can enter the field; and that there must be more competition. Praise be to the Lord that he spoke these truths.

However, the people should be informed by official Commission action rather than by public speeches which may tend to commit or embarrass the Commission and confuse Congress and the industry.

When the President recently cancelled his numerous speaking engagements in the interests of his job it was heartening to the country. This quasi-judicial Commission was hired to make tough decisions, not flattering speeches to the industry it regulates. The Commission has a mountain of unfinished business right here in Washington which demands its undivided attention for months. In this connection, it is reported that James E. Webb, the new undersecretary, has put the State Department to work. According to a recent newspaper article by Richard L. Stokes, one admiring subordinate said, "Boy, has he put this Department to work." Another added, "Since Mr. Webb came in, all of us even walk faster." A driving spirit such as this in the Federal Communications Commission is a must.

Since the Federal Radio Commission was created in 1927 and the Federal Communications Commission in 1934, there has grown up over the years a body of communication law, based on these Acts, and based on the rules and

regulations adopted by the Commission itself and based on its own decisions and on the court decisions affecting it. That is as it should be.

Devious Procedures Employed

Under such a system citizens doing business with the Commission should know their rights and duties. But do they? Ask any broadcaster in America today if he knows how the Commission is likely to act in a given set of circumstances. Ask any member of the communications bar here in Washington if he can advise a client how the Commission may rule under certain conditions. But ask them privately; don't ask them in an open hearing where their testimony will become known. If they criticize the Commission publicly, cases in which they are interested will suddenly begin to run into mysterious and exasperating delays; difficult engineering points requiring clarification will crop up where the technical matters had appeared to be settled; additional information dealing with stock ownership or financial standing suddenly will become necessary; some other station miles away will belatedly file an objection to a grant or change in license; or simplest and yet most devious of all, the case will just not be reached because of the "heavy workload piled up on the Commission".

These tantalizing procedures are common practices. It is known as "regulation by the lifted eyebrow". If some bright young man on the staff likes the color of your necktie, or the social or political philosophy you express, you have a fair chance for relatively prompt action. Better yet, if you are a former employee with friends on the staff, you might not only get your own cases out quickly, but actually [fol. 1489] succeed in delaying the cases of your opponents. This explains, in part, why a particular application may get through in two weeks while another application might wait four years. These time periods are not exaggerated; the record bears them out.

Staff Runs Commission

It is the staff, and principally the legal staff, that runs the Commission. It sets the schedules; it assigns cases to orders of priority; it pushes or slows the engineering and accounting bureaus as it deems expedient; it makes up the

weekly agenda of cases for the Commission to act upon. If now and then a commissioner, who may have been prodded by a congressman in behalf of a constituent who has a lagging case, inquires about it, he is glibly told that it has run into engineering problems, or it has been held up in accounting, or there are some legal matters "we are checking on".

A typical case was called to my attention some weeks ago. A man wrote me from Hutchison, Kansas, where he is interested in the local baseball team. He had worked out arrangements to have the games played at night broadcast by the small local station. The station operates daytime only but more than a year before, it had applied to the Commission for a change in frequency and power, and for fulltime operation. Another station promptly filed a protest, charging interference. The Hutchison station then sought another frequency, found it, filed a new application, and the station which had filed the protest, withdrew it. Apparently, the way was now clear for action. But when I had inquiry made, I was informed that the application stood fifty-second on what they call the second processing line. The "second processing line" is reserved for cases, "more involved technically". There is little hope of the Commission reaching final decision on this case for a long, long time and the Hutchison people will have been deprived of a fine public service. Yet no other station would have been harmed by approval. Why such simple cases must lay around for fourteen to eighteen months without a decision I cannot understand. But that's the way it is.

Another exasperating example involves allocation of frequencies for dispatching taxicabs. When the Commission announced nearly two years ago that frequencies would be assigned for use by taxicabs, applications poured in from all over this country. Then due to a faulty allocation plan they ran out of frequencies; furthermore many frequencies assigned to taxicabs resulted in sharp interference. So further assignments were frozen.

The proposal to allocate new frequencies was made in June of last year, the Commission indicating that a determination would be made by September. However, the hearing went through October. The Commission promised an immediate decision last December, and certainly not later than the first of the year. It is now April and still no

decision. Meanwhile, throughout the country taxicab companies who purchased expensive and costly equipment are not able to use it and all of the big talk a year ago about providing a new and worthwhile service for the people is monologue.

I recall a case where the original plans and financing for a radio station were premised on an investment of some $60,000 by three war veterans; when final Commission action was taken three years later, the costs had mounted to above $140,000. Meanwhile, legal fees, expenses of numerous trips to Washington, reluctance to move into other fields while their application apparently was still alive, wiped out their equity. This pathetic story can be duplicated scores of times.

Democratic Government Prostituted

It should be clear that in most instances, *no* action and *no* decision is far worse and far more deadly than an adverse decision. When a citizen receives a final determina-[fol. 1490] tion, he can go to the courts for justice, if he thinks he has a good case, or he can drop the matter, and employ his talents and capital elsewhere. But consider his situation when the decision is delayed for years. He and his associates, who have raised capital and made plans for building a station, or an improvement helplessly wait and watch while the economic situation changes for the worse. They cannot let go and they cannot hang on without suffering terrific financial loss.

Mr. President. Democratic government was created to aid citizens in achieving their legitimate social and economic aims; not to impede and repress them in their aspirations.

It is scandalous, shocking, and disgusting when such things happen. Why have they been permitted to continue? No other independent arm of Congress has been under such frequent and constant criticism as has the Federal Communications Commission and yet most of these criticisms have come to naught. The Commission's staff is too adroit and cunning to permit a real investigation to take place.

When a resolution for investigation goes through, there is an immediate assaying of the members of the investigating committee as to how they may be placated. If an application is pending for a license in Senator X's state the

applicant learns quickly that the Commission was about ready to act on his case, but now, unfortunately, the request for data and appearances before the investigating committee will slow up final action. The applicant thereupon gets in touch with his congressman and tells him what a great job the Commission is doing and suggests caution. Has Congressman Y or Z ever called regarding a station? If so, move their matters along, or hold them up, whichever seems better calculated to keep the congressmen from becoming too nosey.

Industry Lobbyists Fly to Rescue

And how the staff uses the industry, big and little, when the Commission faces an investigation! The only time I ever remember a powerful segment of the industry openly opposing the Commission during an investigation was in the Fly regime when he had proposed the adoption of the so-called network rules. But even then, while the radio industry's spokesmen inferred that the Commission was red, socialistic, and destructive of the American free enterprise system, the smaller broadcasters were more or less quietly supporting the Commission's proposal.

Ordinarily, however, the Commission can rely fully on the industry's willing legmen and well paid lobbyists to aid them. In the guise of being anti-Commission they counsel with and advise the investigating committee of leads that turn out to be either blind alleys or of little material consequence.

Industry Spreads Sunshine

The campaign to prostitute the FCC goes on and on. The technique is old but surprisingly effective. The inspiration for it is based primarily on the Commission's power to give or take away; to help or hinder; to grant favors or deny them; to make or break a licensee; to build or destroy. The Commission has the communications industry, large and small, in mortal fear of what it can do to them. That is why they move heaven and earth to get a friendly appointee on the Commission; why they wine and dine them; pretend to consult them not only about their aches and pains but about their most informal views on the most casual matters.

A Commission defender may point out that it has revoked only two or three licenses in its whole history. But

it is the club behind the door that brings home the bacon. The threat of license revocation; or the threat of a lengthy and expensive hearing; or the desire to have the Commission approve an increase in power or an additional circuit to a foreign country; or a request for purchase of another station; or the planning for or the promulgation of certain engineering standards; these are the compelling factors which inspire craftiness and intrigue.

[fol. 1491] Commission Violates Own Rules

That atmosphere exists because the Commission gives lip service to its own rules, regulations and previous decisions. It is no secret that in decision after decision the Commission either violates or bypasses its own rules. For instance, a wealthy New Yorker for years has continued to own two stations in violation of the duopoly rule.

Unfortunately, some commissioners have been confused by involved legal arguments made to them by their own staff. Such arguments appear compelling to the Commission when the staff contends it is trying to avert an adverse court decision. All too frequently a decision is written in such a way as to make it difficult if not impossible for an applicant or a licensee to get into court. A broadcaster may be granted a temporary renewal license while the Commission reviews his operations. In fact, he may be kept on a temporary basis for three or four years. All that time his economic neck is in the noose, never knowing when the trap will be sprung. After all, if the Commission revokes his license, his entire investment is gone. Usually, after a lengthy period of consideration, the Commission will renew the license but issue a lengthy opinion whose *obiter dicta* informs *that* licensee and *all other* licensees how on that point to conduct themselves.

That is judicial law making. It is an undemocratic and immoral procedure. It is a corruption of the legislative process without following the prescribed hearing formula. It is bureaucratic tyrannny. Even though they never appeared in a hearing and never had an opportunity to state their views licensees are bound by this strategy. The victim cannot set it aside; he had nothing to go to court about; he didn't lose his license and has no cause of action. Unfortunately, this practice is indulged in by too many of our regulatory agencies.

And who do you think writes these decisions—the Commission? Oh no! The legal opinion and drafts of decisions are written by the identical legal staff which prosecuted the case in behalf of the Commission in the first instance. A number of the legal staff represents the Commission in the original hearing, questions and cross-examines litigants; a month later, or six months later, or perhaps two years later, he prepares the Commission's final decision in the case.

In their last annual report the Commission said, "any final order is *subject* to judicial review in accordance with the appellate provisions of the Communications Act and the Administrative Procedure Act."

Of course, in theory, any order is *subject* to legal review; in practice, relatively few can get into court. Take, for example, the Commission's Port Huron, Michigan decision last year involving a station's duties in handling political broadcasts. After putting the licensee on a temporary grant and keeping him there for a year, the Commission majority decided that the licensee had done wrong and told him how and what he must do in the future. It did not revoke his license. The licensee was gratified that he could remain in business and, of course, he had no cause of action because he had not been deprived of any material thing. Obviously the decision was not subject to court review. The Commission's decision bound him, and by its dicta set a course of action for all other licensees to follow.

The Commission in its last annual report boasts that 21 cases went to the courts. This total of 21 cases is not impressive when it is understood that eight cases were on a single issue and were consolidated. Whether 14 litigants getting into court during more than a year is significant or not must be evaluated in relation both to the total number of cases handled by the Commission and, more important, whether or not the cases went up on substantive grounds or on procedural grounds. The small number that get to court on substantive points bears out the contentions of legal experts that their only hope for the future is broadened use of the Administrative Procedure Act. There is significance in the fact that the Commission's legal staff strongly resisted the efforts of the last two chairmen of the Senate Interstate and Foreign Commerce Committee

to tighten up procedural and appellate provisions of the Communications Act.

[fol. 1492] License Trafficking Permitted

Another grave charge is that the Commission has permitted the operation of a particularly nefarious practice which involves trafficking in Federal licenses and construction permits. It has become a common practice for construction permits to be advertised openly for sale for substantial sums. Engineering and legal fees may amount to as little as $2,000 and then be sold for $50,000 or more. Sometimes construction has begun; a building or a part of a building is up; or even a transmitter built. Sometimes the station may even be running its tests preliminary to actual operation. The authority to build and operate a station in a particular community is what is offered for sale. In my opinion, it was not the intent of the Communications Act that permits should be peddled to a second party.

In Washington liquor licenses are transferred for substantial sums, but broadcast licenses ought not be sold over the bargain counter like beans in the corner grocery.

With the advent of television there is now opening up a new field for the exploitation of construction permits and station licenses. For example, a motion picture group has an option to purchase a small local 250 watt station for a substantial sum of money premised on that station securing a television channel allocation. No television allocation—no sale. Under such a policy, who do you think will finally own and control television in this country? Under the law the Commission is required to determine the moral fitness of a licensee.

Commission Responsible

In the final analysis, it is the Commission rather than the staff on whom the responsibility for all these acts of ommission and commission must fall. Every succeeding chairman and many of the members have been appointed with the avowed objective to clean out the Aegean stables. The top staff personnel, who for years have been writing the decisions and guiding the policy, cannot easily be set aside, so imperative in effecting a shakeup. Before he under-

stands the job the chairman resigns, selects the crown prince to succeed him, moves on to greener fields and the Commission is back where it started and doing business in the same slip-shod, extra legal, awkward, ponderous way under the guiding hand of the career men on the staff.

The staff itself, as a whole, perhaps should not be severely criticized. Most of them are civil servants, working their way up and largely content to do their day-by-day tasks to the best of their ability. It is human and entirely commendable that staff members are on the lookout to better themselves. The legal and engineering experts realize that their best opportunities on the outside lie either with the large corporations or with well established legal firms. But the Commission should realize the temptations inherent in such a situation and govern itself accordingly.

A few, three or four persons in key positions, control the whole operation, and Mr. President, they control it! The organization of the Commission and its laxity and reluctance to face realities insures such control. The Commission, as a Commission, is just not on the job enough. Weeks may go by without a quorum.

[fol. 1493] Absenteeism Rampant

During the last six months one commissioner has been compelled to attend the high frequency conference in Mexico City; another has had to spend considerable time in Europe on mobile and safety service matters; most of them will be involved in the Fourth Inter-American Radio Conference here in Washington late this month; and two of them leave next month for Paris where they will have to spend several months taking part in the Telegraph Conference beginning in May. The North American Regional Broadcasting Conference is tentatively scheduled for September in Quebec. It is just one international conference after another.

It is my opinion as heretofore stated that additional personnel would result in greater delays and that increased salaries justified as they are as a matter of equity, would not improve the service materially. In certain activities, the Commission already has too many rather than too few employees. Out of a total of 1,400 about 900 are in Washington and 500 in the field. Most of the latter are engaged

in what is known as field engineering and monitoring work. It would appear that this latter activity could be cut down considerably without any serious consequences. In the early days when radio transmitter equipment was not as well engineered as today, the Commission did have to police the airways and keep stations on assigned frequencies. Today's fine equipment doesn't need that kind of surveilance.

Big government is dangerous; our's has gotten alarmingly large and shockingly inefficient, as the Hoover Commission reports clearly show. Changes in organization to make better use with more direct control of the staff now employed rather than have more people falling over each other will cure some of the trouble in the Commission.

As a matter of fairness and justice, however, I favor increases in salaries and especially in the Federal Communications Commission where expertness and good judgment are so necessary. But I am not foolish enough to believe that higher salaries will mean different employees. When salaries go up, as I hope most earnestly they do, we will see the same old faces, the same reactionary attitude toward progress and the same outside controls operating.

In this intriguing and fascinating industry every staff member and every commissioner faces the greatest challenge imaginable to do a job. If the challenge of pioneering in the most attractive scientific venture of all time is not enough to bring out the best there is, an increase in salary will not do it.

Chaos Prevails

In summary, it would appear to me that an honest and sincere evaluation of all of these charges and a frank willingness to meet them squarely would result in a house cleaning and shuffling of staff personnel; a reorganization of procedures; and a firm resolve to keep a quorum of the commissioners around the table until the logjam had been broken and some semblance of order restored where chaos now prevails.

Monstrous Decision Imminent

It is charged that the Commission is almost ready to hand down a decision in the clear channel super power case favorable to the clear channel lobby. Mr. President, I most earnestly hope and pray that rumor is wrong. Such

a decision would do the gravest violence to some 2,000 small and medium broadcasters throughout this country; would intrench more firmly the power and dominance of perhaps ten to fifteen major broadcast stations; and eventually would result in three or four New York and Chicago corporations controlling the program material pouring in a never-ending stream out of 70 million radios in the United States. Mr. President, such a monstrous decision would over-step the basic authority of the Commission. When such fundamental policy decisions are made Congress must make them.

[fol. 1494] People Face Exploitation

And finally, it is charged that the television allocation policy adopted several years ago under the Denny regime and being followed today by the Commission will result in the exploitation of the industry and monopoly control of programs. Mr. President. That policy allocation was designed to discourage the overwhelming majority of broadcasters from getting into television; will prevent the building up of a nation-wide service in television; will keep each new development and improvement in television from the public until those in control of patents have had a full opportunity to exploit the present market to the fullest and then, and then only, let the people in on the scientific developments which scientifically are ready now. Mr. President. Such a policy will maintain and perpetuate a tight monopoly control of what is undoubtedly the most potent and effective propaganda medium yet known to man.

Not only is the development of television vital to the people but domination of standard AM broadcasting may affect the very future of our kind of government. Involved in both is the specter of rigid monopolistic control of these media. The connivance of the staff of the Federal Communications Commission, wittingly or unwittingly, in these dangerous trends is obvious to all who have the facts. Actually the Commission does have the facts but appears unwilling to reverse its earlier decision.

Every radio station in the United States is affected by the clear channel super power controversy. Every member on this floor has received at one time or another communications from radio stations in his state or home town about it. Members fear they are being led into some techni-

cal wilderness and shy away when the subject is broached. There is nothing at all technical about it. It resolves itself into whether or not the Congress should permit its own creature, the FCC, a free hand to make a basic and fundamental policy decision of vast proportions which directly affects the general public interest and welfare. It is a policy and not an engineering decision.

Is the Congress the law-making body or is it a regulatory agency, pushed on by powerful, concentrated, economic interests and a skillful and highly-paid lobby, to be allowed to twist and distort the law against monopoly and hand down a decision which will do violence to every precept of free, competitive American enterprise?

Clear Channel Stations Have Wide Coverage

Ordinary radio service is known as AM, an abreviation for amplitude modulation. In the radio spectrum AM is located on your radio dial between 550 and 1600 kilocycles. There are 1060 kilocycles for radio use, which are divided into 106 frequencies or channels, upon which the signal travels. Each channel or path is 10 kilocycles wide to prevent interference from an adjoining channel. In the United States there are more than 2,000 radio stations occupying these 106 channels with each station assigned to a specific and fixed channel. Obviously, crowding 2,000 stations on 106 channels requires that each channel must accommodate an average of twenty stations. But the stations themselves vary, depending on their power and coverage. Small local stations, some daytime only, operating with 250 watts cover a very limited area and therefore are duplicated scores of times on the same channel throughout the country. The next class of stations having power of 1,000 up to 10,000 watts, cover a larger area and thus can be duplicated less frequently on the same channel.

Finally, there are 22 stations operating with power of 50,000 watts covering a wide area which during nighttime hours are the sole and only occupants of a channel. In other words, no other station, no matter how remotely located is permitted to use that channel at night. Thus the term "clear channel" arises; the channel is clear; no other station occupies it at night. This is true even though the clear channel station may be located in New York City and its signal heard only as far away as western Pennsylvania.

Nevertheless, the Commission will not assign that New York channel to a station in Pasadena, or Seattle, or Houston, or Birmingham, or Cheyenne, or Reno.

Even worse, the Commission has adopted rules which will not permit a small local station 1,000 or 2,000 miles away from the clear channel station to use that same frequency during early morning hours or during early evening hours.

[fol. 1495] Discrimination Against North Carolina

Senator Hoey's state of North Carolina is an important tobacco growing region. At Rocky Mount is a small local station which desires to render a service to the local tobacco farmers by broadcasting early morning weather and market information. That Rocky Mount station is permitted daytime use of a channel controlled by station WGY, a clear channel station in Schenectady, N.Y., owned by the General Electric Company. But the Rocky Mount station cannot begin operation before sunrise each morning and must close down at sunset each day. Many months ago the station applied for permission to start broadcasting one hour from 4 to 5 o'clock each morning so that the farmers would have information before going to the fields or into market. The Schenectady station did not operate at that hour and no one used that frequency and Rocky Mount could not interfere with the Schenectady station or any other station.

What did the Commission tell them? Why simply that it has a rule that would not permit the Rocky Mount station to render this public service to the tobacco farmers unless they had the permission of General Electric. Neither General Electric nor any other clear channel station would grant such permission since it would be frowned upon by the clear channel lobby.

FCC Policy Hits Small Stations

There are literally hundreds of such small, local stations, rendering, or attempting to render, a good local public service which cannot broadcast an evening high school basketball game, or a debate, or a local public service feature, or give early morning weather reports. Their broadcasts do not interfere with the clear channel station. It will not broadcast local crop information or a local high

school basketball game, or local musical programs or any other local matter. Many of these stations are operated by cities and towns and by colleges and educational institutions; many of them are non-profit stations rendering a fine public service and anxious to give even greater public service. The clear channel lobby playing dog in the manger, fortified by a convenient Commission rule, prevents the continuation of the Commission's earlier duplicating policy. The law plainly directs the Commission to serve the public interest and not the clear channel lobby interest. The clear channels belong to the people, not to General Electric or to anyone else. The clear channel stations are merely licensed to use them in the public interest.

In my opinion, the rule prohibiting daytime stations from broadcasting at night is wrong. But under the law one might respect it if the Commission treated all comers alike. It does not do so. The right pressure in the right place has influenced the Commission to violate this rule, just as it has conveniently by-passed other rules and precedents. For example, New York City's municipal daytime station, occupying a clear channel, has just been granted a six month temporary authorization to broadcast until 10 o'clock at night. This harms no one and serves a useful purpose and I rejoice that it was done but why discriminate and play favorites between Senator Hoey's Rocky Mount and New York City? Why deny non-profit educational stations in Iowa, Illinois and Oklahoma the same rights?

I repeat, these favored clear channel stations occupy a frequency reserved exclusively to themselves for nightime broadcasting. With the power they now have, they can cover an area approximately 750 miles in radius, some a little more and some a little less. These 22 stations are located in the large metropolitan cities of this country—New York, Schenectady, Pittsburgh, Philadelphia, Louisville, Nashville, Chicago, Fort Worth, Dallas, San Antonio, Los Angeles, Salt Lake, etc. Some of these cities have three clear channel stations. Theoretically they are supposed to render a service to rural listeners. But the overwhelming majority of them are located east of the Mississippi, in the heavily populated metropolitan areas. Do not overlook that their tremendous income comes from advertising based on the coverage of millions of city people.

Actually clear channel farm programs reach a small portion of the farm population. Farmers get their local weather information and other programs of particular interest to them from their local stations which understand their problems and have the available radio time to devote to news and information of special interest to them.

[fol. 1496] Originally this country had 46 clear channels. But as the need grew for additional local and regional stations, the Commission began to duplicate clear channel frequencies, placing additional stations on the same channel but sufficiently distant so that there would be no interference.

Clear Channel Lobby Formed

Several years ago sixteen clear channel stations realizing that this sensible and necessary trend would eventually catch up with them, banded together into a lobbying organization. This lobby filed a petition with the Commission demanding that the remaining clear channel stations be granted 750,000 watts of power, that they might give better service to 23,000,000 rural listeners. They make this ridiculous argument with a poker face. That the 23 million farm people could be better served by local stations, the product of duplication, is glossed over by the clear channels and the obedient Commission.

On this petition, the Commission held extensive hearings comprising 6,700 pages of testimony, 421 additional exhibits and voluminous briefs. Furthermore, based on a bill I introduced last year the Senate Committee on Interstate and Foreign Commerce held one of the longest and most exhaustive hearings in which I have ever participated. More than 70 witnesses testified in person and some 600 radio stations in this country sent in letters or statements making a printed record of more than 1200 pages.

Chicago Tribune Station's Vast Coverage

It is not difficult to understand what is back of the petition to grant these clear channel stations 750,000 watts of power, and what the effect on other stations and on the country would be. The Chicago Tribune, the spearhead of the lobby seeking superpower, is demanding 750,000 watts. Today, with 50,000 watts, that station covers roughly a semi-circle ranging from the Alleghanies on the east to

Kansas and Nebraska on the West, and south into Kentucky and Missouri. In that vast area there are scores of other stations, small locals and medium size regionals, some prosperous and some not so prosperous. They must live on advertising and they must compete with the big clear channels for a fair share of the territory's advertising dollar.

The Chicago Tribune station is supposed to be serving the farmers in all this vast area, despite the fact that ten different kinds of weather may exist at the same time in various parts of the area and despite the fact that in one section tobacco is the crop, in another corn, and in a third wheat, or dairying, or beef cattle production. There are not enough hours in the 19-hour broadcast day to put out all the varying information it really takes to give a good service to each of these local sections of that territory, carry the network programs it is obligated to carry, and at the same time serve the Chicago metropolitan area from which it derives most of its revenue.

High Power Means Monopoly

That's the picture of a clear channel station as it operates today, with 50,000 watts of power. Now, what would the situation be with 750,000 watts?

The area to be covered would increase in size materially; the Chicago Tribune's voice then would be heard in the two Dakotas, Michigan, Minnesota, Iowa, Kansas, Nebraska and Oklahoma, parts of Colorado, Wyoming and Montana, south to the Mexican border, and eastward beyond the Alleghanies. In the area it previously covered with 50,000 watts its signal would be so powerful that no station could compete.

How long do you think national advertisers are going to pay for 20 stations to cover an area which they can cover with one? One thousand and even 1,500 miles from Chicago the voice of the Tribune would be heard clear and loud and strong, by the rural people and hundreds of cities already being well served by their local stations. Obviously, these smaller stations, now suffering drops in revenue, would wither on the vine.

[fol. 1497] Now, multiply the Chicago Tribune case by ten or twelve 750,000 watt stations located so their combined broadcasts completely blanket the entire United States.

How many regional radio stations are going to remain in business in this country in competition with that kind of monopolistic operation?

The economic effect of this super power broadcasting would be appalling. A small group of owners would control radio in this country. That is bad enough but consider the frightening political and social consequences of such a development.

For example, how would the senator from Minnesota (Mr. Humphrey) fare if during a political campaign he had to make arrangements with the Chicago Tribune for time for a broadcast to cover his state of Minnesota?

Or the senator from North Dakota, (Mr. Langer) trying to buy time to speak to his constituents on a matter of great consequence to them?

Or the senator from Wyoming, (Mr. Hunt), who just came through a successful campaign. How would it have been if he had to do his broadcasting from Chicago to catch the radio ear of the Wyoming people?

Is the Senator from Alabama (Mr. Hill) going to have to use the clear channel stations in Louisville and Nashville in order to talk to his people in Alabama? He may have to compete for time with the senator from Florida (Mr. Pepper) who will have to use one of these stations to get his views across to his Florida voters.

How can these clear channel stations begin to give service to all the people to whom they seek to furnish radio service?

What kind of a country are we going to have when a half dozen corporations control the airways of America? I don't care how pure they are, or how public spirited, or how fair. It is not in the democratic tradition that this potent medium of propaganda be in the hands of three New York corporations and three of four other powerful station owners.

These reasons are compelling enough to warrant the closest congressional scrutiny of this monstrous and wicked proposal.

I have never heard a senator complain that the rural people in his state are not getting radio service; what they do tell me is that local stations are deprived of rendering a better service by the rules and the regulations of the Federal Communications Commission which keeps them off the air.

Duplication Improves Service

Many states require additional radio stations which they cannot get now because there are no channels on which to place them. But if the Commission would place additional stations on the remaining 22 clears a substantial number of additional stations would become immediately available. Obviously, there is no interference to a New York station if another station is placed on its channel west of the Alleghanies. Cheyenne and Reno need 50,000 watt stations to serve large, thinly populated rural areas. But Cheyenne and Reno can not provide state wide radio coverage because no frequencies not controlled by the 22 clear channel stations remain available.

I emphasize that if and when additional stations are added on these clear channels nothing would be taken away from today's clear channel stations. They would continue to cover the area they now cover; they would continue to broadcast with 50,000 watts; they would remain the large and powerful stations they are today. But seemingly there is no limit to their greed and their ambition to dominate America.

I repeat once more that the clear channels themselves do not belong to these stations. These channels belong to the people but the Federal Communications Commission which was created to protect the people, preserves them for a private monopoly and refuses to break them down. [fol. 1498] I have been damned by the clear channel lobbyists and their powerful friends for resisting their vicious objective. More than a year ago, our Committee asked the Commission to withhold any decision in the clear channel case pending hearings on the bill I introduced to require duplication and limit power to the present 50,000 watt grant. Consistently and continuously the Senate has made it clear to the Commission that it doubts their authority to grant super power to clear channels under the Communications Act which requires competition in radio and especially that licenses be granted in the public interest, convenience and necessity. The objective of the grasping clear channel lobby is directly contrary to the public interest; it assures monopoly rather than competition, and above all else it is a direct threat to the freedom of broadcasting information.

FCC Decision Expected

In spite of the clear intent of the law, the Chairman of the Commission in recent public speeches has hinted that the Commission might make its clear channel decision around May 1. It would be a fatal step against the people of the United States should the Commission in this decision fail to limit power to 50 kilowatts and abandon its precedents for duplication of clear channels. The two thousand small stations throughout the United States who would be harmed directly have no effective legal remedy to stay the proceedings and prevent a super power grant. Even if they could secure an injunction and try the matter in the courts, who among them can afford the lengthy and expensive litigation that would be involved in going to the Supreme Court of the United States against the rich and powerful interests who seek this stranglehold on the public opinion of America?

As I understand it, the Chairman's position at the moment is that the anticipated development of the radio art has made the super power question academic. But I maintain such an assumption is not the answer. The Commission has the legal duty to foster competition and it should not rely on hoped-for economic factors to solve this vital issue. Affirmative action in the interest of competition which would effectively halt monopoly is mandatory now if the public interest is to be served.

Hemisphere Agreement Cited

One reason assigned for making an early pro-clear channel decision is that this country's proposals for the North American Regional Broadcasting Conference must be circulated among the signatory countries by May first. I want to make it plain that I think we should have had a decision in this case years ago but not in the interest of monopoly and special privilege.

It would be well to bear in mind that six countries in this hemisphere, Canada, Cuba, the Dominican Republic, Haiti, Mexico, and the United States are signatories to what is known as the North American Regional Broadcasting Agreement. It expired in 1946 but was renewed until March 29, 1948. Legally, no agreement exists today. A conference to discuss a new Agreement is scheduled to be

held in Quebec beginning this September. The usual practice in such conferences is for each of the participating countries to formulate their proposals six months in advance and circulate them among the participating countries so that each will be familiar with the other's proposals prior to the conference.

This agreement, commonly known as NARBA, assigns and allocates frequencies—not stations—to be used by each of the signatory countries. Let me emphasize that NARBA allocates frequencies, not stations. This Agreement stipulates the rights to use frequencies; it defines the various classes of stations and the service areas; and it defines hemispheric interference. Under that Agreement the 106 channels in the standard broadcast band, to which I referred earlier, are broken down into 59 clear channels, 41 regional channels and 6 local channels. Of the 59 clear channels, the United States was granted 46 with a high degree of protection from interference by any of the other signatories. The other 13 clear channels were assigned among the remaining signatories with the same degree of high protection for use in those countries.

[fol. 1499] In the United States 24 of our 46 clear channels have been duplicated, that is more than one station has been placed on each of these frequencies in order that we might accommodate the demand for stations in this country. The remaining 22 clear channels successfully have resisted duplication and have retained for themselves the sole and exclusive night-time use of their individual channels. They are the king-pins of the radio world and are officially designated as Class I-A stations.

Despite the fact that nowhere in the Agreement is there any mandate that Class I-A stations should have power in excess of 50,000 watts, the clear channel lobby insists that the Agreement contemplates that the Federal Communications Commission should grant them operating power of 750,000 watts. This lobby contends that if we do not increase the power we will lose our exclusive rights to these clear channels. A more distorted interpretation of very clear language cannot be imagined.

I cannot believe that our country, or that any of the other five signatory countries, ever would have signed an Agreement which required them to operate their own domestic stations according to a pattern laid down by other countries.

To the contrary, the only logical assumption is that each country agreed with the others with respect to the assignment of channels between them and the kinds of stations that would operate on these channels. Obviously, each country should have the right to operate its own domestic radio stations in such manner as is most suitable and desirable for the public welfare of that country so long as such operation does not interfere with the operation of radio stations in the other signatory countries.

Nevertheless, the clear channel lobby asserts that this country must go to the Quebec conference with a proposal that class I-A clear channels should operate with 750,000 watts of power. Whether or not the State Department, which is responsible for negotiating international agreements, and the Federal Communications Commission will fall for this poppycock remains in grave doubt. I cannot believe that the State Department will countenance such a selfish American program.

Frankly, I am at a loss to understand the lobby's line of reasoning. In the first place, I am opposed to 750,000 watt operation of radio broadcasting stations in the United States because of the certainty of resulting monopoly control. In the second place, I can see no reason why the formal proposals of the United States should include any reference to the amount of power with which Class I-A clear channel stations should operate so long as we continue to operate them with the 50,000 watt minimum set forth in the agreement.

I repeat, none of the other participants in the conference should be interested in what amount of power we use in this country so long as we do not cause interference to their stations; similarly we should have no concern as to the amount of power they use so long as they do not cause interference to our stations. On this basis, and on this basis only, the United States should promise its NARBA proposals.

Will Oppose Agreement

Cuba and Canada are not pressing for any change in power. While today Mexico is operating several stations with power in excess of 50,000 watts, I was informed by high and reliable government authority there that such operations are uneconomic. I was told that while they would not look with favor upon some other country telling

them what power they should use, they would favor an agreement limiting power for all of the signatories to the North American Regional Broadcasting Agreement. We cannot cure the very unsatisfactory Mexican broadcasting situation by going to super power ourselves. Such an attempt is certain to lead to a radio power race and is a resort to the law of the jungle to work out a good neighbor problem. Obviously, this is directly contrary to the good neighbor policy.

I repeat again, it is my considered judgment that the Federal Communications Commission would repudiate the clear intent of our Communications Act if it were to render a decision granting authority for the operation of our clear channel stations with super power. This act requires that there shall be competition in radio broadcasting and that assignments of frequencies and power shall be made in [fol. 1500] the public interest, convenience and necessity. I contend that an allocation of power in excess of 50,000 watts would be detrimental to the public interest, convenience and necessity.

Let me make it very clear here and now that if the Federal Communications Commission does hand down a decision granting super power to any radio station in the United States and if the State Department will propose that as a policy at the Quebec conference, as a Senator of the United States and as Chairman of the Senate Committee on Interstate and Foreign Commerce, I shall go to Quebec on my own and make clear in every way I can that any such agreement will be opposed in the Senate of the United States to the limit of my ability. Nor shall I rest until the present power limitation is restored by law. I am certain that I will have plenty of help in the Congress when the 2,000 radio stations in the United States and the listening public discovers by bitter experience what has bee foisted on them.

Television Monopoly Shaping Up

The clear channel super power question does not stand alone as a symbol of monopoly and economic tyranny. The same dangers are present even in a greater degree in television. In television, as in standard AM radio, the Commission seems to be flirting with the idea of going along

with the engineering and economic thinking of big private interests who have planned a policy of tight control.

It is time that members of Congress should know more about television. This highly entertaining art brings to the citizens of selected large cities interesting and entertaining programs which are bound to improve in the days ahead. It is a rapidly expanding industry. The people of the United States already have purchased more than 1,300,000 receiver sets. There are now 60 television stations on the air and applications have been filed for more than 300 new stations. Chairman Coy has predicted that within a decade there may be as many as 800 television stations and possibly 20 million or more receiving sets in use. Leading personalities of the radio industry believe that ordinary aural radio broadcasting is on its way out and television is the coming thing. I do not wholly agree, but certain it is that television in the large cities is crowding AM.

Today's Television Limited

Today television operates on 12 channels in what is known as the Very High Frequency band. The original assignment was 13 channels but interference made one channel unusable. Other interference problems have cropped up, all combining to bring into serious question the entire original allocation and the standards then adopted. In any event, it has been obvious for a long time that the 12 channels now being used will not provide a competitive nationwide television service and Commission spokesmen frankly say so.

However, there is ample space in the spectrum to operate television so that the entire nation might be served. That space is known as the Ultra High Frequency band. The space occupied by the present television channels ranges from 44 to 88 megacycles and from 174 to 216 megacycles. The Ultra High band ranges from 480 to 920 megacycles. Obviously, there is a lot more space for television in the Ultra High than in the Very High band.

Today television operates on a channel six megacycles wide; that is, the electrical impulse that carries the picture and the voice is six units wide. Assuming the Ultra High spectrum was divided into channels six megacycles wide, 73 channels would become available as compared to the 12 channels presently being used in the Very High band.

Here then is the opportunity to really provide a competitive nationwide service, when and if every community desiring television can support it economically.

[fol. 1501] But the Commission stuck to the Very High band, assigned 13 channels and adopted standards which limited the operation to black and white television. This was done despite the fact that one of the large units in the radio industry testified at length and fought to secure a decision which would permit operation of color television. But an even larger cog in the industry vigorously opposed color standards at that time and insisted that the industry was not ready for good color television.

Commission adoption of that view, whether or not it was technically correct at the time, further entrenched monopoly control of television. When the decision came down for black and white operation every major unit in the radio broadcasting industry which could afford it filed applications and sought to expedite construction of television stations. In the forefront of this movement was the National Broadcasting Company, a subsidiary of the Radio Corporation of America, which probably has done the major experimental work in television and which asserts control of the overwhelming majority of basic patents for the manufacture of television transmitters as well as receivers. It is to the credit of the Radio Corporation that it risked its capital, even though this was no eleemosynary act on its part in view of its dominant position in the industry and its tremendous investment in patents. It had opposed color; it had opposed opening up the Ultra High band to commercial operation; it had advocated certain engineering standards; and it had won Commission acceptance all down the line. It is obvious that as the industry prospered, the company prospered.

Television Service Limited

Under the regime of former Commission chairman Charles Denny, now an executive vice president of the National Broadcasting Company, the 12 channels first assigned would restrict television to 394 stations in 140 metropolitan communities in the United States. Some cities would have as many as five stations; some only two. But if senators think that all the cities in their states were going to have television, they have another think coming.

There are more than 2,000 cities in this country with a population of 5,000 or over and obviously some 1,800 cities were not to have television under the original plan.

That allocation could not stand up. When senators and congressmen would finally realize a year or two hence that television had become a caste service and could be made available on a nationwide basis only through a scheme that pumped the New York and Hollywood programs through a monopoly controlled system, all the past criticisms and complaints about the Commission would fade into insignificance compared to the roar which their constituents would thunder at them.

The experts testified again. The principal difference now was that those who had urged previously that color television be permitted in the present channels were strangely silent. Under the law the Commission is directed to promote every advance in the art. It dare not sit idly by waiting for the industry to time progressive steps. Memoranda from some of the Commission's own technical people showing that color could be used, that additional frequencies could be employed, were not touched upon and the serious problem of patent controls was hushed up. Everyone in the industry was actively pushing black and white; no one wanted to be left behind in the race for the lucrative profits that were anticipated from advertising.

After this hearing the Commission proposed a revised allocation of television channels. This time it broadened the base; the total number of cities that *might* have television was increased to 459 and the total number of stations boosted to 955. This is still a long way from giving competitive television service to the people of the United States. The theory was fine, as far as it went, but would it work? How much separation was necessary between channels occupied by different stations in the same town? How close or how far away could one town be from another for an acceptable use of the same channel? To what extent will there be blurred reception in the area where two stations in nearby cities are on the same channel. An ad hoc committee was created to find the answers.

[fol. 1502] But this committee of experts faced an even more embarrassing problem. Several years before, the Commission had removed other services from the Very High frequencies and granted the channels to television.

That was done even though some engineering authorities asserted at the time that it was an unwise allocation and would bring headaches. Now, the committee of experts finds itself in a quandary. Their new engineering data appears to be at sharp variance with the data that was used several years before to support the original television allocation.

Now it is discovered that television stations on the same channels must be 225 miles apart to insure no interference. To slow up opening of the Ultra High frequencies the high and mighty in the industry are attempting to convince the Commission that synchronization solves the interference problem. It did not solve it between Detroit and Cleveland.

Perhaps the committee of experts hesitates to write a report which will make clear that the present television allocation scheme just will not work; that too many stations have been allocated on the same channels in cities too close to each other. Such a finding would buttress with engineering documentation the frequently repeated charge that the original television allocation was and is a monopoly device. Also such a finding would make obvious the need for a quick shift into color and the Ultra High frequencies so that a non-monopolistic and truly nationwide television service might become available.

Assuming the expert committee is permitted to make an objective and factual report, the present Commission must either openly disavow the television allocation of a few years ago and start all over again or fumble around in an attempt to remedy the basic error that was committed.

The Commission, under its new chairman, continues the search for a way to patch up the abortive allocation. Unfortunately, their planning does not contemplate a new and fresh start. Apparently, the pressure is too great and the Commission too timid to take such a constructive step. Last September the Commission proclaimed a freeze on further television applications while it worked out the complicated details. That freeze continues today.

That the Commission recognized fully that the Ultra High frequencies would be necessary eventually is obvious from the fact that it set aside those frequencies for television. Some day an alert and progressive Commission is going to open the Ultra Highs to commercial television operation. Some day, an alert and progressive Commission is

going to allow color television to be operated. Since such steps will prevent monopoly and tight control, powerful industry interests, anxious to tune the "*time*" to its own profits, connives for delay. Perhaps it is natural they should do so. But why should the Commission be blind?

A large corporation, holding control of basic patents on transmitting and receiving equipment, collecting royalty tribute from all other manufacturers, and owning five television stations favorably located in the largest cities, has compelling economic reasons for freezing television allocations and standards until the time is ripe for a shift. It needs time and opportunity to build a nationwide network; it wants time and opportunity to merchandise millions of receiving sets. Then, when an obliging Commission would agree and announce that television is ready for the new day, the second skimming of the cream could begin. The Commission apparently is naive enough to believe that monopoly is avoided because patents are freely licensed; they do not appear to understand that if the timing of each step can be influenced, the selfish objective of monopoly control has been effectuated.

[fol. 1503] Under these circumstances, it is obvious why Congressman Harry Sheppard has again proposed legislation which would effectively bar all manufacturing enterprises in the communications field from holding a broadcast license or operating a radio network. Such a prohibition would remove once and for all the constant specter of monopoly with which no Commission seems able or willing to deal.

There are other disturbing facets to this monopoly picture. Broadcasters who have been convicted of anti-trust violations are granted increases in power; interests who have accepted consent decrees stand defiantly at the counter demanding the right to get into television; networks "move in" to exert even greater control of their affiliates by becoming brokers for national advertising. The Communications Act itself makes quite clear that convicted monopolists should not hold licenses. But strangely enough, the Commission has never promulgated a rule which would settle directly once and for all its own interpretation of the Act on the rights of those who have run afoul of the anti-trust laws. It gives lip service to its network rules.

The Communications Act, which the Commissioners have

sworn to administer honestly and faithfully, declares that they shall:

> "generally encourage the larger and more effective use of radio in the public interest"

and it makes certain and positive their duty to protect the public interest, convenience, and necessity and to preserve competition.

In the final analysis the Commission has one overriding duty:—to push the development of the art. It has data and skilled engineering advice in its own files which say that color is ready; that the higher frequencies can be used.

Television Faces Change

Television today is not what this visible art will finally be any more than Wright Brothers' "Kitty Hawk" can be compared with today's jet propelled bomber. Already, television in the laboratory surpasses in very material aspect what is on the market. The imposition of arbitrary standards by a government agency can have no other effect than to freeze the art until such time as powerful interests order the thaw. Standards must be elastic so that American brains and inventive genius will have freedom and the challenge to move forward as fast as science permits.

Let me make it clear that no one realizes more than I what difficult and vexing engineering decisions are involved. Television today is still a rich man's game; pickup and transmission equipment costs huge sums of money; the existing channels which have the better coverage have been assigned to large cities; and uncertainty and confusion continue to exist about allocations and standards. The Ultra High frequencies which offer so great an opportunity for expansion and competition are not yet fully explored for the visible art largely because they have not been allocated for television use.

Make Television Competitive

All that I am seeking is to make television a wide-open competitive business. Development and improvement will then come along rapidly under our free enterprise system. There can be no objection to the big networks getting into television; on the contrary we should be glad that they took

the initiative and risked their capital and I commend them for it. But I do not want the Commission to be their pawns. I do not want the Commission to wait until the last boat in this fascinating field has put to sea with none of the little fellows aboard.

Some way must be found to make it possible for the little fellow to get into this business, and to get in as rapidly as possible. As television pushes forward in the radio field, the source of the present radio stations, advertising revenues will dry up; the average broadcaster cannot stand those losses for five or six years. He must be given the opportunity *now* to make constructive adjustments.

[fol. 1504] If there is to be a preferred class for television licenses, certainly those who pioneered in the radio industry; those who have rendered a magnificent public service in the broadcast field are entitled to consideration. The grandfather tradition must not be forgotten. The Commission has recognized that its first allocation plan is wrong; it has proposed a second plan which is also wrong; while there is still time to rectify the mistake it might give consideration to a plan which will allow the average broadcaster in the average sized city to get into television and promote the same very satisfactory and effective competition we enjoy in radio today. Color television will help the little fellow because he could get local advertising revenue which he can not get with black and white. Opening up the Ultra High's to commercial operation with color would compel the radio industry with the laboratories and the large staffs of skilled engineers to get in and develop the Ultra High's instead of hanging back to first exploit the lower frequencies.

What I am concerned about, and what every member on this floor and in Congress must be concerned about is in the future who will furnish television programs; who will control the medium; who will own the stations?

In this magnificent frontier of modern miracles slumbers the opportunity to revitalize, expand and restore freedom of information. It is a job to which every individual commissioner and every member of Congress should address his undivided attention, remembering first and foremost that the cornerstone of American life is the freedom of the individual—freedom in his economic pursuits and above all freedom of thought and ideas. The Congress working closely with the Federal Communications Commission as a

team fighting to protect the people can make these freedoms living realities.

[fol. 1505] Copy

United States Senate
Committee on Interstate and Foreign Commerce
Washington, D. C.

August 22, 1949

My Dear Commissioner Jones:

Thank you very much for the copy of your letter of August 19 to Dr. Frank Stanton of Columbia Broadcasting System. I am grateful to you for your courtesy in sending me that letter in view of my interest in urging that nothing be done to block the progress of color television.

In writing that letter you have rung the bell in my opinion and I commend you for it. I believe you will be interested in the letter I have today written Vice Chairman Walker on these points and my letter to Dr. Frank Stanton.

I am certain that your colleagues will go into the forthcoming television hearings with an open mind not only anxious to hear and see all the facts, but they will insist that all of the facts be presented to them. If that is done, I have no doubt what the final answer will be.

Sincerely yours, (S.) Ed C. Johnson

Honorable Robert F. Jones
Federal Communications Commission
Washington 25, D. C.

[fol. 1506] Copy

United States Senate
Committee on Interstate and Foreign Commerce
Washington, D. C.

August 22, 1949

Dr. Frank Stanton, President,
Columbia Broadcasting System,
485 Madison Avenue,
New York, New York

My Dear Dr. Stanton:

It gives me great pleasure to tell you how much I enjoyed the demonstration of color television staged by Smith Kline and French with Columbia and Zenith equipment, on August 19 at the Armory here.

It was a magnificent and utterly convincing proof that color television is here now, and that all that is necessary for it to sweep the nation is for the Federal Communications Commission to remove the road block and promulgate standards for its operation. Almost without exception, all who saw it to whom I talked were astonished and captivated by it; few of them knew beforehand of its present state of development.

While I realize that Columbia is assiduously careful to explain that these demonstrations are not sponsored by it, nevertheless the people of this country owe a tremendous debt to your company for its courage in investing large sums in research and for the progress in the consistent development of the broadcasting art.

I am convinced that if the broadcast licensees of this country could see that demonstration, they would quickly realize that a great day has come for them. Those who have pioneered in black and white television have made heavy investments and have taken heavy losses in its operation, color television is certain to eliminate that financial loss No one who sees color is ever going to be satisfied with ordinary black and white television again. It is not enough to make the comparison between black and white motion pictures and technicolor. A more apt comparison is between the old Model T and today's superb automobile.

However, the reluctance to show the Federal Communications Commission the facts by those who know most about color and who can most effectively demonstrate its development disturbs me. On this point I am sure you will be interested in the letter I have written Vice Chairman Paul Walker of the Commission, which I am enclosing.

With my very best regards, I am

Sincerely yours, (S.) Ed C. Johnson

[fol. 1507] Copy

United States Senate, Committee on Interstate and Foreign Commerce, Washington, D. C.

August 22, 1949.

My Dear Commissioner Walker:

I have received a copy of the letter of Commissioner Robert F. Jones to Dr. Frank Stanton of the Columbia Broadcasting System dated August 19 in which Commissioner Jones requests certain information from Dr. Stanton dealing with refusal by manufacturers to construct color transmitters and receivers and Columbia's alleged inability to make available a sufficiently large number of color converters for field tests for the Commission's September television hearings.

The questions raised by Commissioner Jones are vital. I am gratified that he has requested this information because obviously it is information that the Commission should have.

It is tragic that so great a development as color television —far superior to black and white—should be arbitrarily blocked by selfish interests. I regret that the very interest which has been most active in pushing color television suddenly has become very cold to further efforts in this direction. Neither I nor other members of this committee who have discussed the subject with them can comprehend their stated reasons.

The color demonstration tests last week at the Armory in Washington, televised direct from a Baltimore station 35 miles away, proved beyond any question that color television is here now. Everyone who saw that demonstration came away aware that they had witnessed a tremendous advance in television—an advance that the people of the

country want and will buy the moment they have the opportunity to do so. Since today's color television is not as good as eventually it will be, it is contrary to the laws of progress for the Commission to wait until color television is perfect before it approves standards. That sort of reasoning may be logical in a totalitarian or corporate state; it is nonsense in a free competitive enterprise economy such as ours. Of course, color television will improve; it will become better and better but that is no reason that the people of this country should be deprived of it now any more than they should have been deprived of crystal set radio 20 years ago.

Based on known demonstration, the plain facts are television licensees can broadcast color signals for comparatively little additional capital investment over present equipment for black and white and with no additional operating cost; every television receiving set now in the hands of the public can be equipped at a relatively modest cost with a convertor or adaptor to pick up color signals. Moreover, if the Commission were to give the go-ahead signal [fol. 1508] for color, receiving-set manufacturers would know with certainty that receivers hereafter manufactured should be equipped for color television reception and an additional market for sale of convertors would be immediately created. To stall, to procastinate, to wait merely means that the great buying public of America would be required to continue to buy black and white receiving sets which eventually will require convertors. The Commission knows that one day it will authorize color; why wait? Who is going to be harmed by authorizing it if after your September hearings you have actual evidence that color television is a workable and practical art.

Of course, no one expects the Commission to act without the facts and the data. This is the reason for your September hearings. The Commission has a clear public duty to see to it that those hearings are productive of facts. Under the Communications Act (section 303 (g)) the Commission must see to it that the broadcasting art progresses and that every bit of information and data bearing on color television is presented to it.

You will recall that this Committee requested Dr. Edward U. Condon of the National Bureau of Standards to create a technical committee of scientific minds to report to it on the technical status of color television. It was our

belief that such a committee would help protect the public interest by presenting independent, unbiased, unimpeachable coldly scientific facts regarding color television. The report of the Condon committee will, of course, be presented to the people through Congress. I am confident that it will not only but-ress the position of those members of the Commission who do not have a closed mind on color television but will make impossible again the action taken by the Commission at the last television hearing when it shut the door on television progress.

I repeat that I am disturbed over the plain implications of Commissioner Jones' letter to Dr. Stanton. Those implications are that the people who know most about color, who have aided greatly in its development and whose equipment has produced remarkable demonstrations of the practicality of color, are reluctant to make the kind of a showing at the forthcoming television hearings which will prove conclusively that color is here now and that standards can be promulgated for its commercial operation.

I assume that Commissioner Jones has good reason to request the information he asked for. I trust that he will have the cooperation of the Commission in his efforts to bring out all the facts at your September hearings.

The Commission, I am sure, is not going to allow itself to be swayed by a few selfish interests, regardless of how powerful they may appear to be. The radio manufacturers who are seeking to slow up the advance of science, and throw road blocks in the way of progress, appear to be motivated by selfish financial reasons. Moreover, compared [fol. 1509] to the millions of people who will benefit from and enjoy this new development, radio manufacturers are few indeed. Nor should the Commission overlook the fact that television licensees themselves will find color television an economic boon; those who are pioneering in television and taking heavy losses in its installation and operation deserve your sympathetic consideration. All of them agree that the use of color will expand advertising revenues so rapidly for them that the red-ink days of television will quickly disappear.

I sincerely hope that the Commission will brook neither delay nor interference in seeing to it that the forthcoming television hearings are full and complete hearings in which every available and ascertainable fact regarding the progress and practicality of color is demonstrated fully and

fairly. It has a duty to do that; as conscientious men and women, sworn to protect the public interest, they cannot and must not do less.

Sincerely yours, (S.) Ed C. Johnson.

Honorable Paul A. Walker, Vice Chairman,
Federal Communications Commission,
Washington 25, D. C.

[fol. 1510] Copy

United States Senate
Committee on Interstate and Foreign Commerce
Washington, D. C.

November 12, 1949.

My dear Mr. Chairman:

From time to time during the recent weeks the radio press has carried short interviews with me regarding the hearings now being conducted by the Commission and television problems generally. In many instances the published stories were only excerpts from the interviews which I gave the reporters.

These abbreviated reports remind one of the fable of the three blind men who examined an elephant. One explored the animal's tail and concluded that an elephant resembled a rope. The second, a very short blind man, wrapped his arms around one of the elephant's legs and decided an elephant was like a tree stump. The third, a very tall blind man, thumped the elephant's side and said an elephant is like a wall. Such distorted descriptions of an elephant and the published excerpts of my interviews both miss the mark.

In order that there may be no misunderstanding with respect to my position on color, UHF and the existing freeze I feel compelled to reiterate my views in brief summary. I have taken great care to state this complete story to the reporters time after time, but apparently only portions of it registered with them.

On Color: It is my earnest hope that the Federal Communications Commission will find it in the public interest to promulgate quickly broad and sufficiently general standards for color so that this essential improvement may be developed naturally in the tradifional American, free

enterprise, non-monopolistic manner. The keener the competition the better. Furthermore compatibility, while desirable, certainly should not be the primary basis for a decision.

On Use of the UHF: I hope, too, that the Commission will approve at the same time standards for the immediate commercial utilization of a large number of channels in the ultra high frequency band so that a realistic nationwide competitive system of television may be developed. I regard it as tragic for the ultimate development of television that the VHF allocation heretofore made is handicapping the adoption of a truly equitable and scientifically practical VHF-UHF allocation. However, I trust that the Commission's final allocation in both bands will take into consideration the problems both of set owners and television licensees and not provide a hodge-podge for each city which may have to be revamped again in a few years. [fol. 1511] *On the Existing Freeze:* The public interest requires an allocation of TV channels which will insure a national competitive system. When the proposed 42 UHF channels are allocated on a city by city basis throughout the nation and standards for their use promulgated there will remain no reason for continuing the present freeze on VHF licensing and, of course, it should then be lifted. The sooner that is done the better. But until a decision is made by the Commission on utilization and allocation of the ultra high frequencies, it would be shortsighted to lift the freeze on VHF licensing. Easily identified selfish interests are laboring day and night to lift the freeze now and nothing more. To lift the freeze without a definite plan for the allocation and use of UHF channels would be both a scientific and economic absurdity.

I am handing a copy of this letter to each member of the Commission and releasing it to the press.

Very sincerely yours,

(S.) Ed. C. Johnson, Chairman.

ECJ/Cc

Honorable Wayne Coy, Chairman,
Federal Communications Commission,
New Post Office Building,
Washington, D. C.

[fol. 1512] For Release Upon Delivery

"The Propaganda Drive to Lift the 'Freeze'"

(Address by Senator Edwin C. Johnson, Chairman, Senate Committee on Interstate and Foreign Commerce, in the Senate of the United States, February 16, 1950.)

Mr. President. I desire to discuss some of the current problems in television which have been receiving considerable attention recently in the press. But first, I ask unanimous consent to insert at this point in my remarks an article which appeared in "The New York Times" of Sunday, February 12, 1950, by Jack Gould, radio editor of that newspaper.

"The Senator Replies"

"Edwin C. Johnson Explains His Position
On TV 'Freeze' and F.C.C.—A Rebuttal"

"By Jack Gould"

"Two weeks ago this department wrote about the Federal Communications Commission's 'freeze' on the authorization of new television stations. In reply, a letter has been received from Senator Edwin C. Johnson, Democrat, of Colorado, and chairman of the Senate Interstate Commerce Committee, which has supervisory authority over the commission's activities. Pertinent parts of the letter follow:

"'I read with a great deal of interest your column, 'Time For Action,' in *The Times* of Jan. 29. Consistently I have admired your forthright, sensible comments. I was, therefore, surprised to have you chide the Federal Communications Commission for being 'susceptible' to my 'beck and call' and that I 'persist in issuing communiques on what the commission should or should not do in highly technical matters.' I try to meet my responsibilities, which are specified by law, to follow as closely as possible all developments and viewpoints expressed on broadcasting matters.

"'Let us examine the principal points made in your column, a major portion of which I agree with

heartily. First, you say 'television is in real trouble.' You point out that the freeze is the source of the trouble and then you enumerate four 'chain of events' flowing from the freeze. I agree those are realistic deductions of the kind of trouble you are talking about and they are premised on sound facts. Then you ask the question, 'Why the freeze?' and proceed to answer it.

Half-Baked

"No informed person will disagree with some of your answers. Of course, there was interference in the 'low band'; of course, no final decision with respect to allocations in the 'high band' could be made until the interference question was solved. Actually, in my opinion, you were charitable in your reference to the interference problem. The Commission found itself in hot water because of its own injudicious half-baked allocation and the only way out was to clamp on the freeze; I had as much to do with inaugurating that freeze as you had, and I have about as much to do with keeping it on as you."

[fol. 1513] "You assert that the FCC has now no excuse for postponing the lifting of the freeze; that it has been agreed that a six megacycle width will be used for both color and black-and-white and that therefore the thing to do is to either open the high band, or find additional channels contiguous to the present low band. Perhaps you are right; perhaps the way is now open for the opening of the ultra highs, or at least, for a switch in the order of the current hearings so that testimony can be heard and agreement reached on the standards for the use of the high band. But here again, you are suggesting a technical engineering step which I do not feel competent to pass upon or give advice and upon which I have never advised.

"I suppose, and here I am only guessing, that the reason the FCC is reluctant to move first into the question of opening up the high band is that it wants to know as thoroughly as is now possible to know just how color will work on both bands, and whether and how the standards must be changed before open-

ing both bands to insure a permanent workable system of nationwide television.

Short-Sighted

"However, I have never said, and do not assert now, that the color question must be settled first; I emphasize again there are technical engineering questions involved here that probably neither you nor I know very much about. I have asserted, and will continue to assert, that to open up the freeze merely for the purpose of making more stations available only on the low band is a short-sighted negative policy which will play into the hands of certain interests and will do irreparable harm even to those licensees who have applications now pending for low band TV stations.

"If the FCC believes it has the engineering knowledge to permit it to open up simultaneously both the low and high bands for TV station assignments, by all means it ought to go ahead with that phase. I agree with you that color will not come overnight; that there will be a transition phase; that there will be a continued service for the vast number of black-and white set owners. In my opinion the commission is asserting its authority properly in the public interest by holding the current hearings and I concur heartily with you that it call in the representatives of the industry and figuratively knock their heads together on matters which are in the public interest.

"I cannot resist pointing out that in recent weeks a new propaganda campaign has gotten under way to have the FCC do one thing—and only one—lift the freeze at once, and to heck with a nation-wide competitive television allocation system. However, very fairly you point out the need for considering the allocations problem on a broad basis of all available channels.

"I hope I am not being petty when I point out that your arguments do not logically lead to the gratuitous paragraph which flails me for something not related to the subject-matter of your article. I do not deny that I watch the FCC's actions closely; the law directs me to do that. I do not deny that I have written the FCC on several occasions with respect to

broad policy matters affecting the public interest over which I have statutory responsibility. But, in fairness, I would not want my lack of comment now to suggest that I am even remotely responsible for the freeze or the engineering facts which have brought it on and which are keeping it on. I am not omnipotent; I cannot alter scientific facts."

Ed C. Johnson, Chairman, Senate Committee on Interstate and Foreign Commerce, Washington, D. C."

"The article to which Senator Johnson refers made it clear that institution of the 'freeze' was due to interference factors. Continuance of the 'freeze' however, has been due not only to interference factors but also to the inordinately complex task of determining the technical merits of the CBS and RCA color systems, a task in which Senator Johnson has played a much more active and specific role than his letter suggests."

[fol. 1514] "In August, 1949, for example, Senator Johnson wrote the Commission that a CBS demonstration proved color video was 'here now' and that there was no reason for further delay in getting it started. In October, 1949, he was quoted as saying 'RCA's system has a potential of acceptance comparable to none.' In November, 1949, he wrote the commission that compatibility of a color system with today's black-and-white method, which is the heart of the RCA plan, 'certainly should not be the primary basis for decision.'

"The whole point of the original reference to Senator Johnson was that such evaluation of the technical and engineering merits of competitive color systems is a logical function of the FCC, which was specifically established by Congress to deal with scientific matters on which it was not practical for Senators and Representatives to legislate. Impromptu opinions on the merits of transmitting systems is not the same as exercising broad supervision over the FCC's affairs, which admittedly is the statutory responsibility of Senator Johnson's committee.

FCC Role

"In the last analysis it is the FCC which must make up its own mind. But the commission can hardly do its job in a healthy climate if it is subjected to constant advice from a group which for all practical purposes has the power of life or death over its existence. Senator Johnson's committee passes on all appointments—and reappointments—to the commission, can conduct inquiries into its affairs, and can be a decisive influence in the amount of its appropriations.

"If Senator Johnson believes that there are certain aspects of broadcasting which should be decided by Congress and not by the FCC, the remedy lies in a revised radio law rather than in the indirect expression of Congressional wishes through statements.

"Senator Johnson, in one letter to the FCC, noted that it was typical of 'totalitarian' reasoning to argue that color TV must be absolutely 'perfect' before it can be introduced. By the same token it is unrealistic that millions of persons be denied excellent black-and-white television for an indefinite period merely because some day there will be color.

"By reason of his commendably sincere interest in broadcasting and the importance of his office, the Senator can make a notable contribution to television by providing statesmanlike leadership in resolving the present impasse which is delaying all kinds of video—both black-and-white and color. His letter, particularly in its open-mindedness on the possibility of a revised approach to the problems of the 'freeze' is a heartening step in that direction."

This article includes extracts from a letter which I wrote to Mr. Gould last week with respect to a previous article by him in *The New York Times* of January 29, in which he urged the lifting of the existing freeze on the allocation of additional television stations. But Mr. Gould conveniently omitted certain pertinent language contained in my letter to him.

For instance, I said:

"Let us examine the principal points made in your column, a major portion of which I agree with heartily.

First, you say 'television is in real trouble.' The greatest trouble seems to be to keep the supply of sets up to the demand; 2,500,000 sets were sold last year. Recent stock market quotations of television manufacturing companies do not reflect very serious trouble. But for the sake of argument let's agree that television is in trouble."

You won't find that language in the Gould article. By omitting it, Mr. Gould avoids an important point which he does not want to face.

[fol. 1515] Again he runs away from realities when in discussing the causes of the freeze he omits this sentence from my letter:

"The truth is that the series of allocations in the VHF band were incorrect, ludicrously incorrect, and no one in the Commission will deny it."

Next he omits these two extremely pertinent paragraphs which presumably do not pour any water on his propaganda wheel:

"You continue that once the question of the high band was raised, the color controversy was dumped into the FCC's lap. You explain, fairly and honestly I may add, that in this color dispute the FCC would like to see the public saved the expense of investing in black-and-white if color can be made a reality in a reasonably short time. That has been my position throughout; about a year ago now when certain engineering studies came into my hands, I became convinced that if the FCC continued to shelve the color question, there was an excellent chance that three things would happen: (a) color would come only when certain powerful patent holding corporations were good and ready for it to come; (b) the chain of circumstances would put the FCC into a position where eventually it could okay only one system of color (because of prior engineering standards which would have been adopted for use of both low and high bands); and (c) television would fall largely, if not wholly, into monopoly control. I have been pleading for color to be given the opportunity to develop in the good old American free enterprise way.

"The FCC, or at least certain members of it, quickly realized the position they were in and, with but a single dissent, last May decided to hold hearings on the two closely related vexatious questions. It was the FCC which decided the order of the hearings; i.e., that the color question be first explored. Again, I had no more to do with that agenda than you; I was concerned only that color not be shunted aside into the indefinite future and that the Commission fulfill its legal duty under the law of pushing every advance and development in the broadcasting art. That there may have been sound engineering reasons for the FCC to first explore color before determining the allocations in the low and high bands is undoubtedly true, but that is a technical engineering question on which I have not commented or given 'advice'."

Gould maintains that the FCC has now no excuse for postponing lifting of the freeze, but when I gave him this reason he didn't publish it:

"It is implicit, of course, from your own argument on this point that you agree that more channels must be available before a final and complete television allocation is made. You obviously agree that to merely open the freeze for the purpose of assignment of additional stations in the low band will defeat the building of a nationwide competitive system of television, regardless of whether that system eventually is a black-and-white or color system."

It is especially revealing when Mr. Gould omitted this sentence from my letter.

"Sure, the FCC 'needs . . . some real gumption and backbone to assert its proper authority' and that gumption should be used, as it is now used, to not let certain publications in the interest of their advertisers call the tune."

He didn't like that and I know why. He wants the Commission to have gumption only to do what he proposes. What a nice cozy little arrangement that would be.

[fol. 1516] Mr. Gould, I presume, does not like anyone to infer that his column is being prostituted by private

interests. That is the only way I can explain his deletion of this language from my letter to him:

> "A leading engineer for the principal patent holder in radio in the course of a letter informed me casually that recent tests indicated that the interference problem for both low and high bands were the same and therefore no useful purpose is served by maintaining the freeze on the low band; the legal counsel for a group of radio manufacturers spent several hours telling us much the same thing; a number of stories have appeared in the trade press recently along the same line; another group of leading lights in the radio industry have requested a conference with me shortly, on the same point; and now your column makes a similar suggestion."

So much for Mr. Gould and his fidelity in serving a pressure group which is determined to dominate the Federal Communications Commission.

Mr. President. I desire to comment briefly about the existing situation in television. It is time that there be some plain talk about this matter. The original television allocation made by the Federal Communications Commission in 1947 provided for 405 stations to be located in 140 communities in the United States. That allocation was made in the "lower band" of frequencies, the area in which the principal experimental work had been carried on. By May of 1948 the Commission had received so many protests from communities which would have been denied television station facilities under the original allocation that it proposed a new revised allocation under which more than 900 stations would be allocated to 461 communities. This was a little closer to providing for a nationwide competitive service. Meanwhile, in the larger cities on the eastern seaboard, permits had been obtained and construction work started on television stations. It wasn't long after the first few television stations went on the air that both the industry and the Commission realized that something was terribly wrong; there was so much interference that reception was wholly unacceptable. It didn't take a genuis to realize that under such circumstances there just wouldn't be a sound television industry capable of expansion.

The original allocation put too many stations on the same

channel too close together. That allocation was premised on use of the same channel by cities separated by something over 100 miles; they placed Cleveland and Detroit on the same channel. In making that allocation the Commission was guided by the engineering brains of the radio manufacturers, principally based on the experimental work of one of them. That experimental work was done in the lower bands, where only a limited number of channels were available. However, the Commission long before had set aside as the permanent home of television a portion of the spectrum known as the ultra high band, where there is ample room for a nationwide television service *without* interference. But those who wanted to push television insisted that the high band should wait; they urged that they be given the green light to go ahead with the lower band. The Commission fell for this engineering argument and it made the allocation which proved so tragically wrong.

By September 1948, the Commission knew it was in serious trouble, so it clamped on the freeze; in other words, it announced it would make no more allocations and permit no further station construction while it ferreted out a solution to the interference problem. By clamping on a freeze, the Commission acknowledged that its original allocation and its proposed revised allocation were ludicrously wrong, based on unsound and unproved engineering data. The freeze had been in effect since September 30, 1948, and no new stations have been authorized since that time. When it went into effect some 40 television stations were on the air and about 60 more had been authorized. Today, there are 99 stations operating in 55 communities and more than 4 million sets are in use.

When the Commission ordered the freeze, it announced that it would hold hearings on the entire subject. Those in the industry who had sold it a bad bill of goods were frantically scurrying around trying new devices and plans and theories to overcome the interference. They were anxious to keep television in the lower band where the original allocation had been made, and opposed the use of the higher band where ample room was available.

[fol. 1517] From September 1948 to the early spring of 1949 the Commission studied, the industry studied, and nobody came up with anything that would satisfy the Commission, which by this time had become exceedingly cautious about moving forward again until it was sure of its

ground. Meanwhile, the Commission also had become acutely conscious of the development of color television and its enthusiastic acceptance by the people. It had held hearings two years before on the use of color and had turned down a demonstrated system on the ground that it was not ready for commercial use. But it realized that some day color television would have to be accommodated and to make a decision on the interference problem without taking into account the use of color would be unwise technically and unsound economically. Should that be done the Commission would find itself in another dilemma shortly with another freeze unavoidable. So in May of last year it decided to hold extensive hearings on the interference problem, the use of both the lower and higher bands, and the standardization of color television. Those hearings began last September and have continued intermittently since. They resume again late this month and no one can say just when they will be concluded.

The Commission's agenda for the hearings specified that it would examine into the development of color television systems first; thereafter study the use of the lower and higher bands. While I am not responsible for the order of the hearings, common sense dictates that the Commission wanted to have all the facts available about color television first, so that when it came to a decision about use of lower and higher bands, it would know just how color should be accommodated. In short, it wanted to avoid its mistake of two years before when it had accepted a half-baked engineering thesis that stations could be on the same channel a hundred miles apart. To avoid areas of television distortion it now plans for a separation of more than two hundred miles.

Lately, certain elements in the television industry are getting ants in their pants. The freeze, they cry, let's get rid of the freeze! Let television go ahead! Forget a nationwide competitive system; forget color; forget using the higher bands! These things can come later; right now let's get television stations operating in another 30 or 40 cities! The Commission, they shout, is stifling progress! The Commission is slow, hesitant, and lackadaisical; it ought to be investigated!

I have never hesitated to criticize the Commission when I thought they were wrong; by the same token I am not

going to remain silent and let them become the butt of unwarranted and unprovoked assault by people who are trying to grind their own ax and without regard to the public interest and the general welfare.

The Commission was terribly wrong technically when it made its original television allocation. No one can deny that now, although there were voices in the wilderness four years ago who warned of the error. But having made a mistake, there is no reason for the Commission to compound the error now by again listening to the same siren voices who were so wrong before and who led them astray.

Nevertheless, to high pressure the Commission and others to their way of thinking, the radio manufacturers now have hired a high-powered public relations firm to grease the skids. The propaganda started rolling. Two months ago I received a letter from Dr. C. B. Jolliffe, RCA's chief engineer and head of their laboratories, in which in the course of other remarks he casually informed me that Dr. Engstrom, their television expert, had recently completed studies which proved that interference problems for color and black-and-white television were the same and that since interference was no longer a problem in the lower bands, there was no point in maintaining the freeze.

Counsel for certain radio manufacturers recently spent two hours talking to me about television problems and conveying the idea that the freeze was unnecessary and improper and that the color television question could be solved in its own good time. The trade press faithfully rallied to the attack with a series of stories, including two highly technical articles which were published in engineering journals. The trained seals took up the chorus with wise cracks. This was designed to furnish headlines for newspapers which devote attention to radio and television matters. Then alert radio writers got the cue and quoted copiously from such authorities as Dr. Allan DuMont and Mr. David Smith of Philco.

[fol. 1518] Last week Dr. DuMont discussed the freeze situation with New Jersey legislators, who, the trade press reports, were impressed by his statements and promised to explore the situation.

Dr. DuMont, so far as I know, is one of the more reputable authorities in the field of radio and television. He has wide technical knowledge and is a successful manufacturer. He operates a television network which competes

with three other and somewhat better entrenched network companies who have been in radio for many years. Understandably and very properly, Dr. DuMont is anxious to expand his television network. So long as the number of cities having television is limited, his network cannot expand. He has been cool, therefore, to color television development and he has been impatient with delays, however unavoidable, since his primary aim is to expand his existing black-and-white network as rapidly as possible.

So Dr. DuMont hurls machine-gun-like innuendo-s and distortions such as these: hundreds of thousands of jobs are being denied workers by the existing freeze; the limits of the industry's expansion are drying up; the industry is becoming stagnant; soon unemployment will be rife in the industry. Mr. Smith of Philco blows the same kind of bubbles and because these men are respected in the industry, their words are widely quoted.

Such statements are mischievous rantings and not based on facts. This talk about unemployment in the industry is not new to me, nor efforts to enlist labor in the campaign to lift the freeze. Some weeks ago I received a letter from Mr. Joseph D. Keenan, director of Labor's League for Political Education, who informed me he had received reports from the electrical workers union that they feared the freeze would result in unemployment for their membership. I answered Mr. Keenan and I would like now to quote from that reply.

> "I recall your conversation with me regarding the reports you have been receiving from local unions of the International Brotherhood of Electrical Workers, arguing that the controversy about color and black and white television, and the present freeze on VHF licensing is causing unemployment.
>
> "Frankly, I just cannot understand the present basis of such reports. In the first place, the controversy between black and white and color television has nothing to do with the freeze on licensing of additional television stations; the freeze was clamped on because of interference between stations, and the Federal Communications Commission is studying, as part of its current overall television hearing, the use of ultra high frequencies and separation of stations on the very high frequencies. I had hoped that the hearing would

be completed before now, but the subject is involved and complicated and it is vitally important, both to prevent monopoly and in the general public interest, that the decision be a sound one for the long pull so that we will have in this country a genuine nationwide, competitive television service. And, of course, the matter is entirely an administrative one and not a legislative one and the Federal Communications Commission would be in a far better position to comment on the time element than would I.

"However, I must call to your attention that television receiver set sales for the year just past will reach the amazing total of 2,500,000; that the month of November broke all previous records for television set sales; that in some areas television sets are actually being black-marketed; i.e., they are in such short supply that premiums are paid to get sets; that no manufacturer in the business can keep up with demands from retailers. Under those circumstances, I fail to understand how there can be any talk of unemployment among electrical workers, insofar as production of television sets is concerned. A similar picture obtains for the sale of radio sets. Certainly, the electrical workers cannot be referring to the amount of employment that would be afforded by the construction of additional television broadcasting stations, once the freeze is lifted. There is very little electrical work in that, except for the building of transmitters, and even that work is insignificant as compared with the employment afforded by volume production of receiver sets.

[fol. 1519] "I am inclined to believe that the reports you are receiving are hangovers from a propaganda campaign initiated many months ago by the Radio Manufacturers Association, which had felt that the advent of color would adversely affect the sale of black and white receiver sets, and therefore they set in motion every wheel they could to becloud the issue. Their interest was—and is—selfish; they desire to exploit the black and white receiver market and hold off color until a rich melon has been garnered, then make the switch and force the public to discard the old sets and buy new ones. Eventually, 30,000,000 Ameri-

can families would have invested $6 billion in black and white sets which would bring tremendous pressure against opening up color television, thus serving the interests of the dominating patent holding corporation in black and white television. The fears of the radio manufacturers lobby that the color question would hurt receiver set sales have proved groundless but they have just forgotten to turn off the propaganda mill; now the facts make them look silly."

The truth of this situation is there is no unemployment in the television industry; it is riding at an all-time peak. As I wrote Mr. Gould, but which he did not quote, the only trouble the television industry has today is keeping up with the demand for sets. Even the manufacturers predict a 4,000,000 set sale this year in the existing 55 market areas now operating. Certainly, recent stock market quotations of television manufacturing companies do not indicate that the companies are suffering. Television stocks have been the market leaders for weeks; one company's stock went up nearly ten points in one week. Certainly, that doesn't reflect any trouble, or any recession in their business either, even though in the last six months set prices have been reduced a third.

Of course, what some of these manufacturers want is a freeze of their own, but their freeze would be entirely different. They want television to go down a blind alley based on the present wholly insufficient twelve channels which will not permit the building of a nationwide competitive television service. They becloud the issue by talking only about wanting to furnish the "dear people" with television programs but no one hears who is to furnish the service; to what extent monopoly control will flourish; and most important of all, which cities will get service and which won't.

Senators from the southeast and the southwest, and the great Mississippi Valley area, and the Rocky Mountain area, have a right to be concerned about the future of television. If the siren voices who rant and rave today about lifting the freeze have their way, thousands of communities will either never have television or at best will receive it through little slave stations operating as satellites of some big monopoly controlled station in a far distant metropolis. If that is the kind of television we visualize for this country,

all we need do is support the "lift the freeze now" crowd in their selfish aspirations.

[fol. 1520] If these short sighted propagandists have their way the indications are clear as to what will not be done. They show little interest in the high band where 60 or more channels are available. In their book, television is merely a class service which can be made to pay big dividends. Why worry about the smaller towns when the larger cities have a greater profit potential. They figure they can service all the large profitable cities with possibly another half dozen channels and the place to get those channels is right in the lower band where the present television channels are located. I should like to do that also but these channels are now assigned to various important Government services, including aircraft communications. Furthermore, FM radio is located there; also various safety services use frequencies in that area. But these manufacturers believe that a drive can be put on to shove these services out of their present position and assign the additional channels to television and everything will be fine—for them. I differ with them in that I want a permanent plan for the long pull based on a sound engineering decision and I want it now.

Only last week I read with a great deal of interest a letter from an eminent radio consulting engineer written to Mr. Max Balcom, president of the Radio Manufacturers Association, dealing with the propaganda wave to lift the freeze.

Says this engineer:

> "We fail to see what information and technical progress have been disclosed which have eliminated the need for the current 'freeze'. RMA has done absolutely nothing except shout compatibility and lift the freeze in order to promote the sale of current black and white sets on a nationwide basis. RMA has not lifted a finger to cure oscillator radiation and image interference both of which can seriously affect the sale of television sets as more sets are sold. Instead, RMA has established a standard of minimum radiation which is patently absurd as FCC well knows.
>
> "There is no evidence that any RMC Committee has studied television as a *system* or that RMA has any idea of the requirements of a truly nationwide system.

In fact, the booklet says the new NTSC Committee is now ready to help if FCC will tell it what to do.

If the RMA Television Committee members believe that the freeze should be lifted, what is the purpose of item 1 in the RMA Recommendations? Why not come out and recommend the adoption of the RCA system with its speed flickering 15 picture per second rate and complex receivers, or the CTI system which will chain future receiver manufacture to projection techniques and and expensve optical system.

"If compatibility is the one and only thing of importance, obviously we do not need the "establishment of sound standards" as stated in Item 1. We already have these 'sound standards' in the form of the present monochrome standards now in use.

"If the RMA Television Committee will abandon its present policy of blind obeisance to compatibility which prevents the free expression of engineering thought and work on this complex problem, we feel confident that the many qualified engineering employees of RMA member companies can do a fine job by developing all of the pertinent facts. The Commiftee can then form a policy based on those facts to replace the present policy which was formulated before many of the facts disclosed during the past six months were available for widespread study by the engineers of the industry."

Mr. President. The campaign to lift the freeze is an artificial fog, spread by expert, high-powered propaganda artists aided and abetted by a public relations agency. Relying on a lack of background and knowledge among those it seeks to convince, it will continue to pressure congressmen and senators. Relying on threats and intimidation, it will continue to pressure the Commission. One plan is to have a congressional investigation of television, as if a congressional committee could deal with technical [fols. 1521-2307] problems of "dot sequential systems", "proper band widths", and a score of other involved technical factors. If there is to be an investigation of television by Congress, let's have one which goes into monopoly controls and patent holding devices and restrictions. Nearly a year ago technical data came into our committee's hands

which will provide an excellent basis for investigating television patent monopolies. Our committee may decide that the time has come to thoroughly explore what is going on, but when it does so, it will be an investigation to determine who is calling the shots, and why. Meanwhile, I know the Commission will proceed with their hearings without becoming ruffled or stampeded by high pressure tactics.

[fol. 2308] [File endorsement omitted]

IN THE UNITED STATES DISTRICT COURT, NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION

Civil Action No. 50-C-1459

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., and RCA VICTOR DISTRIBUTING CORPORATION, *Plaintiffs*,

vs.

UNITED STATES OF AMERICA and FEDERAL COMMUNICATIONS COMMISSION, *Defendants*

Before MAJOR, *Circuit Judge*, SULLIVAN and LA BUY, *District Judges*.

OPINION—Filed December 22, 1950

MAJOR, *Circuit Judge*. This action was brought to enjoin and set aside an order of the Federal Communications Commission, adopted October 10, 1950, effective November 20, 1950, which promulgated standards for the transmission of color television. Plaintiff Radio Corporation of America (RCA) is engaged, among other things, in research and development work in the field of electronics, and particularly in the field of radio and television, as well as in the manufacture and sale of radio and television transmitting and receiving apparatus and parts. Plaintiff National Broadcasting Company (NBC) is engaged in sound and television broadcasting, including network broadcasting. Plaintiff Victor Distributing Corporation is engaged in the sale of articles and products manufactured by the Victor Division of RCA. Both this distributing company and

NBC are wholly owned subsidiaries of RCA. The defendants are the United States and the Federal Communications Commission.

The complaint sought an interlocutory injunction until the further order of the court and a permanent injunction [fol. 2309] upon final hearing. The defendants moved for a summary judgment and a dismissal of the complaint on the ground that there was no genuine issue as to any material fact and that defendants were entitled to a judgment as a matter of law.

A three-judge court was convened, as required by Title 28 U.S.C.A. Secs. 2284 and 2325. On the issues thus presented, the matter came on for hearing and oral argument was heard on November 14, 15 and 16, 1950.

Prior to the time of oral argument, the Columbia Broadcasting System (CBS), also engaged in sound and television broadcasting, by agreement of the parties, was allowed to intervene in support of the Commission's order. Either during or previous to the oral argument, the following parties, over the objection of defendants, were permitted to intervene in support of plaintiffs' attack upon the Commission's order: Local No. 1031 of the International Brotherhood of Electrical Workers, representing 21,000 members, 18,000 of whom are employed in Chicago or vicinity in the manufacture of radio and television sets or in the manufacture of parts and in the assembling thereof; Pilot Radio Corporation; Emerson Radio and Phonograph Corporation; Wells-Gardner & Company, Sightmaster Corporation and Radio Craftsmen, Inc., all manufacturers of television receiving equipment; and Television Installation Service Association, a trade organization engaged in the business of servicing and installing radios and television equipment in the Chicago area.

The statutes involved with respect to the jurisdiction of this court are Title 28 U.S.C.A. Secs. 1336, 1398, 2284, 2321-25 and Sec. 402 (a) of the Communications Act of 1934, as amended, Title 47 U.S.C.A. Sec. 402 (a). With respect to the legal authority of the Commission to adopt standards, the provisions of the Communications Act mainly involved are Secs. 4 (i), 301, 303 (b), (c), (e), (f), (g) and (r). Secs. 4 (i) and 303 (r) of the Communications Act endow the Commission with authority to make rules and regulations and issue such orders as may be necessary in

the execution of its functions and to carry out the provisions of the Act. Sec. 303 (b) authorizes the Commission, as the public convenience, interest or necessity requires, to prescribe the manner of the service to be rendered by stations, and Sec. 303 (e) gives similar authority to regulate the kind of apparatus to be used with respect to its external effects. Sec. 303 (g) provides, under the same standard of the public convenience, interest or necessity, [fol. 2310] that the Commission shall "study new uses for radio, provide for experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest."

As has been shown, there was before the court at the time of the hearing plaintiffs' prayer for an interocutory injunction and defendants' motions for a summary judgment and for dismissal of the complaint. Numerous affidavits were presented by the plaintiffs as well as by the plaintiff-intervenors, showing that irreparable damages would result if the order was permitted to take effect. Opposing affidavits were filed by the defendants and by CBS, the defendant-intervenor. There was also presented by the Commission a record of the proceedings, upon which its order was predicated.

At the conclusion of the hearing, the court took the conflicting motions under advisement and at the same time entered a temporary restraining order "restraining and suspending until further order of this court the promulgation, operation and execution of the order of the Federal Communications Commission adopted October 10, 1950, effective November 20, 1950." As a basis for this order the court entered findings of fact, including the finding, among others, that irreparable damages would result to plaintiffs and intervenors unless the Commission's order was restrained and suspended during the consideration and determination of the issues before the court, and that such temporary suspension would be in the public interest.

The order sought to be set aside has been the subject of attack on many fronts, which may be generally classified under two contentions, (1) that the order is contrary to the public interest, and (2) that its adoption represents an arbitrary and capricious attitude on the part of the Commission. Under these two general categories there are, of course, many subsidiary issues. The defendants

concede that RCA has an interest which permits the maintenance of the instant suit, but that there is an absence of such interest on the part of the other plaintiffs, as well as on the part of the intervening plaintiffs. For the purpose of this decision, we shall assume that all the plaintiffs, as well as the intervenors, are properly before the court.

After listening to many hours of oral argument by able counsel representing the respective parties, we formed some rather definite impressions relative to the merits of the order, as well as the proceedings before the Com- [fol. 2311] mission upon which it rests. And our reading and study of the numerous and voluminous briefs with which we have been favored have not altered or removed those impressions. Also, in studying the case, we have been unable to free our minds of the question as to why we should devote the time and energy which the importance of the case merits, realizing as we must that the c ntroversy can only be finally terminated by a decision of the Supreme Court. This is so because any decision we make is appealable to that court as a matter of right and we were informed during oral argument, in no uncertain terms, that which otherwise might be expected, that is, that the aggrieved party or parties will immediately appeal. In other words, this is little more than a practice session where the parties prepare and test their ammunition for the big battle ahead. Moreover, we must give recognition to our limited scope in reviewing an order of an administrative agency. While citation of authority in this respect is hardly necessary, it may not be amiss to make reference to a few recent Supreme Court opinions.

In *American Telephone & Telegraph Co. et al.* v. *United States et al.*, 299 U. S. 232, 236, wherein the court had under review an order of the instant defendant Commission, the court stated: "This court is not at liberty to substitute its own discretion for that of administrative officers who have kept within the bounds of their administrative powers. * * * it is not enough that the prescribed system of accounts shall appear to be unwise or burdensome or inferior to another. Error or unwisdom is not equivalent to abuse."

In *Federal Security Administrator* v. *Quaker Oats Co.*, 318 U. S. 218, 227, the Court of Appeals for this Circuit set aside the order of an administrative agency. The Supreme Court reversed and with reference to review

provisions of administrative action, stated: "Under such provisions we have repeatedly emphasized the scope that must be allowed to the discretion and informed judgment of an expert administrative body. [Citing cases.] These considerations are especially appropriate where the review is of regulations of general application adopted by an administrative agency under its rule-making power in carrying out the policy of a statute with whose enforcement it is charged." And further the court, referring to the judgment of the administrative agency, stated (page 228): "That judgment, if based on substantial evidence of record, and if within statutory and constitutional limitations, [fol. 2312] is controlling even though the reviewing court might on the same record have arrived at a different conclusion."

More recently, in *National Broadcasting Co., Inc. et al.* v. *United States et al.*, 319 U. S. 190, 224, the court reviewed and sustained an order of the instant Commission, and in doing so stated: "The Regulations are assailed as 'arbitrary and capricious.' If this contention means that the Regulations are unwise, that they are not likely to succeed in accomplishing what the Commission intended, we can say only that the appellants have selected the wrong forum for such a plea. * * * Our duty is at an end when we find that the action of the Commission was based upon findings supported by evidence, and was made pursuant to authority granted by Congress. It is not for us to say that the 'public interest' will be furthered or retarded by the Chain Broadcasting Regulations. The responsibility belongs to the Congress for the grant of valid legislative authority and to the Commission for its exercise."

Thus, with our scope of review so firmly delineated, we turn to a brief statement, if that is possible, of the proceedings which culminated in the order under attack. The Commission for many years had considered the question of color television. CBS had formerly proposed a system, which was denied in 1947. The instant proceedings, or that part which related to color television, were initiated by the Commission's notice of July 11, 1949 of further proposed rule-making relative to color television. This notice proposed among other things to consider color television systems, provided that such systems met two criteria: first, that they operate in a six-megacycle channel (the frequency space allotted to black and white television

broadcasting stations); and second, that the pictures be received on existing television receivers "simply by making relatively minor modifications in such existing receivers," and the notice provided, "following the closing of the record and the conclusion of oral arguments, the Commission upon consideration of all proposals, counter-proposals, and evidence in this proceeding will adopt such rules, regulations and standards as will best serve the public interest, convenience or necessity." In response to this notice, comments relating in whole or in part to color television were filed by numerous parties. CBS, RCA and CTI (Color Television, Inc.) were the only parties who appeared as proponents of their own color television systems.

[fol. 2313] The hearing, participated in by all members of the Commission, commenced September 26, 1949 and ended May 26, 1950. In all, fifty-three different witnesses were heard and 265 exhibits received. The transcript of the hearing covers 9717 pages. During the period from November 22, 1949 to February 6, 1950, extensive field tests were made of the three systems proposed. Progress reports concerning these tests were filed with the Commission by the three proponents during December 1949 and January 1950. Comparative demonstrations of the three proposed systems were made on different dates until May 17, 1950. In response to the Commission's notice, proposed findings and conclusions were filed by proponents of the three systems.

On September 1, 1950, the Commission issued its first report, in which it made detailed findings and conclusions concerning the three proposed color television systems and set forth minimum criteria which such a system would have to meet in order to be considered eligible for adoption. CTI is not a party to this proceeding and there is no occasion to refer to the findings as to its proposed system. We set forth in a footnote the basic findings as to the system proposed by RCA and that proposed by CBS.[1]

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[1] As to RCA:

"(1) that the color fidelity of the RCA picture is not satisfactory and that there appears to be no reasonable prospect that the defects can be overcome;

(2) that the texture of the RCA color picture is not

[fol. 2314] Notwithstanding the findings favorable to the CBS system, the Commission declined in its first report to adopt that system. Instead of and concurrently with its first report, the Commission issued a second notice of further proposed rule-making, suggesting the adoption of bracket standards in the existing monochrome television system and invited interested parties and all manufacturers to submit comments on the proposal. This proposal embodied a method by which brackets would be incorporated in the receivers thereafter manufactured so as to permit such receivers to receive black and white pictures from present transmissions as well as color transmission by CBS. The stated purpose of this proposal was to pre-

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satisfactory and that it is difficult to see how this defect can be eliminated;

(3) that the receiving equipment utilized by the RCA system is exceedingly complex and that there is no assurance, even if the tri-color tube is successfully developed, that the RCA receivers will not continue to be unduly complex and difficult to operate;

(4) that the equipment which RCA utilizes at the transmitting station is exceedingly complex and there is no assurance that satisfactory commercial type station equipment can be built;

(5) that the RCA system is much more susceptible to certain kinds of interference than standard black-and-white or the CBS color system;

(6) that there is not adequate assurance of RCA's ability to network color of proper quality over existing facilities; and

(7) that the RCA system has not been sufficiently field tested."

As to CBS:

"(1) that CBS produces a color picture that is 'most satisfactory from the point of view of texture, color fidelity and contrast';

(2) that the CBS receivers and station equipment 'are simple to handle' and within the economic reach of the public;

(3) that though the CBS system is susceptible to flicker to a greater degree than standard black-and-white, the problem is not serious since flicker, which

serve the status quo on compatibility.[2] Maintaining the status quo on compatibility required the construction of receivers capable of receiving field sequential color transmissions in black and white. Comments upon the proposed bracket standards were received from thirty-three interested parties and television receiver manufacturers which disclosed an almost unanimous opinion on the part of manufacturers and other interested parties that such a system was not capable of being produced within the time limits fixed by the Commission.

On October 4, 1950, RCA filed a petition requesting the Commission to view the improvements made in the performance of the RCA color system between December 5, 1950 and January 5, 1951, and that the Commission view further experimental broadcasts of the three proposed color systems during the period to June 20, 1951, before reaching a final determination with respect to color standards. This request by RCA was denied, and on October 10, 1950, the Commission issued its second report, which concluded that the field sequential color system should be adopted. No testimony, oral or written, was received by

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results from brightness, does not appear at the brightness level which is adequate for home use;

(4) that while the CBS system has less 'geometric resolution' than black-and-white, the addition of color more than outweighs this loss, and that the black-and-white pictures produced from CBS color are acceptable; and

(5) that while as a practical matter the apparatus now used by the CBS system is limited either to projection receivers of unlimited size or direct-view pictures of 12½ inch size, this size limitation will be eliminated if and when a commercial tri-color tube is successfully developed, and that in any event the public might well prefer a 12½ inch color picture to a 16 inch black-and-white picture and should not be deprived of that choice."

[2] The term "compatibility" describes a situation in which no change whatever is required in existing receivers in order to enable them to receive as black and white picture a picture transmitted in color.

[fol. 2315] the Commission in the interim between the issuance of its first and second report.

In its second report (issued October 10, 1950) the Commission, with reference to its first report, stated: "The Report stated that in the Commission's opinion, the CBS system produces a color picture that is most satisfactory from the point of view of texture, color fidelity and contrast. The Commission stated that receivers and station equipment are simple to operate and that receivers when produced on a mass marketing basis should be within the economic reach of the great mass of purchasing public. The Commission further found that even with present equipment the CBS system can produce color pictures of sufficient brightness without objectionable flicker to be adequate for home use and that the evidence concerning long persistence phosphors shows that there is a specific method available for still further increasing brightness with no objectionable flicker. Finally, the Commission pointed out that while the CBS system has less geometric resolution than the present monochrome system the addition of color to the picture more than out weighs the loss in geometric resolution so far as apparent definition is concerned."

Simultaneously with the second report the Commission entered the order under attack, amending the Commission's Standards of Good Engineering Practice, to provide for standards of color television transmission in accordance with the field sequential system (CBS system) effective November 20, 1950. Commissioners Sterling and Hennock dissented from the Commission's second report. On the date of the issuance of its second report, the Commission also denied the petition of RCA to postpone a final determination of the color proceedings and to have further demonstrations of the three proposed color systems.

While the findings of the Commission are severely criticized, it is not contended in the main that they are not supported by substantial evidence. It is pertinently pointed out, however, that a number of critical findings are based upon evidence which was taken in the earlier stage of the proceeding which is not representative of the situation as it existed at the time the findings were adopted. Admittedly, much progress was made during the latter portion of the hearings and, as claimed, after the hearings closed, in the development of a compatible system of color

television. Particularly was such progress made by RCA, and as we view the situation the most plausible contention made by plaintiffs is that the Commission abused its dis- [fol. 2316] cretion in refusing to extend the effective date of its order so that it might further consider the situation, and particularly the improvement which it is claimed had been made by RCA and others.

On the merits of the case, however, with which we are directly confronted by reason of defendants' motion for a summary judgment, much of plaintiffs' argument—in fact, the major portion of it—is predicated upon matters outside the record made before the Commission, and without going into too much detail we think it relevant to refer to some of such matters. While many affidavits offered by the plaintiffs as well as the intervening plaintiffs are proper, no doubt, to show damage in support of their asserted right to an injunction, many of them go far beyond this purpose and contain a recitation of alleged facts directly in conflict with the findings made by the Commission. Typical of such affidavits is that of Dr. C. B. Jolliffe, Executive Vice President in charge of the RCA Laboratories. His affidavit, in addition to showing damages which will be sustained by RCA as a result of the order, goes extensively into the alleged merits of the RCA system, the alleged demerits of the CBS system and the alleged errors committed by the Commission in reaching its decision. And much of plaintiffs' argument is predicated upon matters brought before the court in this fashion. In our view, such asserted facts are not properly before the court. A consideration of such matters would in effect amount to a trial de novo, which we are without power to grant. Thus, much of plaintiffs' argument, predicated upon such immaterial matter, appealing as it is, must be discarded.

Another segment of evidence upon which much reliance is placed is the report made by the so-called Condon Committee. Dr. Edward U. Condon, Director of the National Bureau of Standards of the United States Department of Commerce was, under date of May 20, 1949, requested by the Chairman of the Senate Committee on Interstate and Foreign Commerce to organize a committee to give "sound, impartial, scientific advice" on color television. Dr. Condon was the head of this committee, which included

a group of scientific persons of repute, none of whom were employed by or had any connection directly or indirectly with any radio licensee or radio-equipment manufacturer. The report of this committee was released July 10, 1950, and considered at length the three color systems which [fol. 2317] had been proposed, and analyzed the present and potential performance of those systems. The report discloses that it took into consideration, among other matters, the testimony and demonstrations given before the Commission in the instant proceedings. No doubt this report refutes numerous of the findings made by the Commission and gives a far more favorable appraisement of the RCA system than that attributed to it by the Commission. Whether this report was considered by the Commission we do not know, but it is not referred to in the Commission's reports or its findings. As stated, this report was made to Congress, and we suppose a court could take judicial notice of it for some purposes, but again, in our view, it cannot be considered here for the purpose of impeaching the order of the Commission or the proceedings had before it. After all, Congress has conferred upon the Commission and charged it with the responsibility of conducting hearings and in reaching its own independent conclusions predicated thereon.

Another matter somewhat akin to those which we have just discussed was sought to be injected into this hearing by Pilot Radio Corporation, a plaintiff-intervenor. At the request of Pilot, two subpoenas duces tecum were issued out of this court on November 8, 1950, one addressed to the Commission and the other to CBS, requiring the production at the hearing in this matter of certain letters, documents, etc., described in said subpoenas. In response to the subpoenas the requested material was produced by the parties to whom the subpoenas were directed and lodged with the clerk of this court. At the same time, a motion was made to quash the subpoenas on the basis that the produced material was irrelevant and immaterial. The matter produced in the main consists of an exchange of letters between Honorable Edwin C. Johnson, Chairman of the Senate Interstate and Foreign Commerce Committee, and the Commission or members thereof, as well as correspondence exchanged between Senator Johnson and

the officials of CBS. In addition, there was offered in evidence at the time of the hearing an exchange of telegrams or letters between Senator Johnson and counsel for Pilot. We are advised by counsel that the purpose of these letters and telegrams is to show "that constant and vigorous pressure exerted by the Chairman" was responsible for the Commission's asserted precipitate action. The matter thus sought to be injected is, of course, no part of the record made before the Commission and it cannot be prop- [fol. 2318] erly considered here. In this connection, we should point out that neither Pilot nor any other intervenor nor plaintiffs make any charge or allegation in their pleadings that the Commission in making its order was influenced, cajoled or coerced by Senator Johnson or anybody else. In fact, other than the incident under discussion, there is not even an intimation by any of the interested parties that the Commission acted other than in good faith and in discharge of what it considered to be its statutory duty. The motion to quash these subpoenas duces tecum not heretofore passed upon is allowed.

Another matter which perhaps should be mentioned arises from plaintiffs' contention that the Commission improperly relied upon the testimony and assistance of one of its staff engineers who it is asserted was an interested party because he was the inventor of an automatic switch usable with a non-compatible system such as that proposed by CBS. The witness was not the owner of and had no financial interest in the patent. He demonstrated the device on the record, to which an objection was made; however, no objection was made to his further testimony or participation in the proceeding. In fact, it appears that the matter was not again mentioned until raised in this court. It appears to us that the interest of the witness if it had any relevancy went to the weight or credit to be given his testimony, and that this was a matter for the determination of the Commission. In any event, it furnishes no basis for invalidating the Commission's order.

In the view we take of the case, there is no evidence under the pleadings which this court could properly hear. We take this view notwithstanding the suggestion made by counsel for RCA in oral argument and reiterated in its brief, that RCA might desire to introduce witnesses at

a final hearing. We gather from the suggestion made that such testimony would be offered for the purpose of showing current developments, which we suppose means developments since the entry of the order, which have been called to the attention of the Commission and which it refuses to consider. Plaintiffs disclaim that this would constitute a trial de novo. With this contention we do not agree. We reiterate that under well established principles our function is to hear and determine the questions before us solely on the record made before the Commission.

[fol. 2319] Thus, as we evaluate the situation, there are two courses open, (1) to allow defendants' motion for a summary judgment, and (2) to vacate the order and send the proceeding back to the Commission for further consideration in view of recent developments in the color television field as well as the rapid changing economic situation. A pursuance of the latter course, assuming we have such authority, of which there may be doubt, would inevitably result in the prolongation of the controversy which badly needs the finality of decision which can be made only by the Supreme Court. In other words, the interests of all, so we think, will be better served with this controversy on its way up rather than back from whence it comes.

Even though we propose to allow defendants' motion for a summary judgment, it does not follow that the temporary restraining order heretofore entered should not remain in effect. In fact, we are definitely of the view that it should, until such time as the controversy is before the Supreme Court. While there may appear to be some inconsistency in pursuing this course, we think such procedure is within our discretion. In *National Broadcasting Co.* v. *United States*, 44 F. Supp. 688, a statutory court under circumstances quite similar to those here held it was without jurisdiction to review an order of the Commission, and dismissed the complaint. Even so, it granted a stay until the matter could be appealed to the Supreme Court. Holding that the District Court had jurisdiction the Supreme Court reversed. 316 U. S. 447. In doing so, it suggested (page 449), "The stay now in effect will be continued, on terms to be settled by the court below." Thereupon, the case was tried by the District Court on its merits, a summary judgment allowed in favor of the

defendants and the complaint again dismissed. And again the Commission's order was stayed pending appeal to the Supreme Court, and this time the judgment of the court below was affirmed. 319 U. S. 190. Insofar as we are able to discern from that opinion, the stay order allowed by the District Court remained in effect until the case was finally decided by the Supreme Court.

Thus concluding that the matter of a further stay of the Commission's order is discretionary, we shall state some of the reasons which move us to preserve the status quo. Of the nine million black and white television receivers in the hands of the public, there are none capable of receiving a picture either in color or black and white, [fol. 2320] broadcast under the proposed standards. In order to receive a black and white picture, it is necessary that a receiver be equipped with an adapter estimated to cost $50.00, plus the expense of installation. In other words, it would cost the American public nearly one-half billion dollars to equip existing sets to receive, under the proposed system, black and white pictures, and even then admittedly they would be of a grade inferior to present black and white pictures. In addition, in order to receive a picture in color, it will be necessary to add to an existing receiver a converter, estimated to cost about $100.00, plus the expense of installation. Thus, this will cost the public nearly one billion dollars. In other words, upon an expenditure by the public of one and one-half billion dollars, adapters and converters can be added to existing receivers so as to receive, under the proposed system, pictures in black and white and in color.

But this is only a part of the story insofar as it relates to the public. It was here stated in oral argument and not disputed that there are no adapters or converters on the market and that manufacturers would require a period of from six to eight months before they could be made available. So it seems reasonable to conclude that if the instant order was now in effect, there would be no broadcasting under the proposed standards for many months, for the simple reason that there would be no sets capable of receiving such programs. And it does not square with common sense to think that manufacturers would rush into the business either of manufacturing adapters and converters for existing sets or manufacturing sets with built-

in adapters and converters while this controversy is pending. And to maintain that the public in any considerable number would purchase adapters and converters, assuming they were available, under the existing state of doubt and uncertainty, is to cast a reflection on the intelligence of people.

Another matter which does not escape our attention is the insistence displayed by the defendants, including CBS, that this order at all hazards must become effective November 20, 1950, the date fixed by the Commission. This apparently was a magic date, so much so that defendants opposed a postponement until this court could have an opportunity to study and decide the issues presented. Perhaps the most substantial attack made upon the Commission's order is the adoption of standards which call for an incompatible system which, as admitted by all the parties including the defendants and CBS, is less desir-
[fol. 2321] able than a compatible system. Of course, the Commission's position in this respect is predicated upon its conclusion that no satisfactory compatible system was demonstrated, while the incompatible system which it approved was satisfactory. And the main argument against a stay of the order is that incompatability is and will rapidly increase as the public continues to purchase existing receivers. As is stated in defendants' brief, "The grant by this court of an interlocutory injunction will encourage the increased sale of receivers requiring outside adaption to receive CBS color transmission in black and white. The difference between this cost and the cost of adapting receivers at the factory is the price the American public will pay if the Commission's decision is finally upheld." This argument is based on the assumption that the Supreme Court will sustain the validity of the order. It ignores a contrary possibility. Certainly this court is possessed of no such omnipotence, and we doubt if the Commission is. Even if the order was in effect, the owners of existing receivers could not within the next several months obtain the equipment which would enable them to receive the authorized broadcasts. But assume that they could and did so. Where would the public find itself in the event the order was held invalid by the Supreme Court?

In our view, the public interest in this matter has been magnified far beyond its true perspective. We are even told that this suit is a contest between television manufacturers and the public on some theory that it is to the financial gain of the former to refuse and delay the manufacture of television sets capable of receiving the broadcast authorized. Any merit in this contention, so we think, is completely overshadowed by what appears to be evident, that is, that the contest is mainly between two great broadcasting systems for a position of advantage in this rapidly developing field of television.

Another reason why this order should be stayed is the existing economic situation, recognized by Commissioner Sterling in his dissenting opinion, wherein he stated, "The problems confronting manufacturers today in terms of production, procurement and manpower to meet the demands of national defense are serious ones. * * It is well known that there are serious shortages of tubes and resisters as well as basic materials. * * Moreover, in many instances industry has been required to divert its TV engineering experts to problems of production for defense because of the close relationship of TV techniques [fol. 2322] to radar and other electronic devices the government requires." It is a matter of common knowledge that the situation thus described becomes more acute with each passing day, and the prospects are that it will be far worse before it is better. It is hardly conceivable that either the Commission or the government would under such circumstances desire, much less insist, that the order in controversy be made effective.

Our purpose is to restrain the effective date of the order until the aggrieved parties have had an opportunity to perfect an appeal to the Supreme Court. Therefore, the temporary restraining order heretofore entered will remain and continue in force until April 1, 1951, or until terminated by the Supreme Court. And we re-adopt the findings heretofore made in support of the continuation of such order.

A summary judgment will be entered in favor of the defendants and against the plaintiffs, and the complaint dismissed. No testimony having been heard or considered

other than the record made before the Commission, no findings are required in support of such judgment.

DISSENTING OPINION

LA BUY, D. J., dissenting:

It is conceded by all and it is self-evident that the best system of color television is a compatible one; that is, a system requiring no change whatever in existing receivers for the reception of black and white as well as color pictures. Indeed, compatability is the coveted goal of all engineers and scientists engaged in the television industry.

In its order of October 11, 1950 (F3), the Commission stated:

> ". . . that the state of the television art is such that new ideas and new inventions are matters of weekly, even daily occurrence; . . ."

And again, in recognizing the rapid developments in the field, the Commission said (B92, First Report):

> "The third matter we refer to is the possibility of new color systems and improvements in existing color systems which have been informally called to our attention since the hearings closed. Of course, these are not matters of record and cannot be relied on in reaching a decision unless the record is reopened. In considering these developments the Commission is aware that the institution of these proceedings stimulated great activity in the color field and that since [fol. 2323] fundamental research cannot be performed on schedule, it is possible that much of the fruit of this research is only now beginning to emerge. ***"

Commissioner Sterling, dissenting with what he characterized the "premature action taken by the majority", also stated among other reasons for his disapproval of the action of the Commission "new developments came fast in the closing days of the hearing and immediately

thereafter". Commissioner Hennock, who also disagreed with the Commission's speedy action, expressed her views as follows,

> " . . . in the light of the progress made in the development of color television since the start of the instant proceeding, I think it is essential to defer final decision in this matter until June 30, 1951.
>
> "*** It is of vital importance to the future of television that we make every effort to gain the time necessary for further experimentation leading to the perfection of a compatible color television system. ***"

In its First Report, the Commission stated:

> "*** two difficult courses of action are open to *to* the Commission. The first course of action is to reopen the record . . . The second course of action is to adopt a final decision.
>
> "The advantage of the first course of action is that the Commission would not be compelled to speculate as to an important basis for its decision . . . The disadvantage is that it would postpone a final decision and hence would aggravate the compatability problem. *** The advantage of the second course of action is that it would bring a speedy conclusion to the matters in issue and would furnish manufacturers with a real incentive to build a successful tricolor tube as soon as possible. *** The disadvantage is that the Commission's determination on an important part of its decision would be based on speculation and hope rather than on demohstrations."

On October 4, 1950 RCA petitioned the Commission to review the progress made in developing and perfecting the various systems before a final determination. It offered to show the Commission improvements in certain phases of their system about which the Commission expressed doubts. The Commission denied the petition giving among other reasons that "delay in reaching a de- [fols. 2324-2325] termination . . . would not be condusive to the orderly and expeditious dispatch of the Commission's business".

The Commission recognized and the record before the Commission is replete with evidence that rapid strides are being made toward the perfection of a fully compatible system. There is ample basis for the conclusion that the scientists laboring in the laboratories of the industry may soon resolve the problem of compatability. In view of the admittedly fluid state of the art, it is difficult to understand why the Commission refused to hear additional evidence and chose instead a course of action, using its own words, based "on speculation and hope rather than on demonstrations."

It is estimated that the cost of conversion to the new standards set by the Commission will cost the public in excess of a billion dollars. If hope and speculation may lawfully be substituted for evidence as a foundation for an important part of its decision, it was an abuse of discretion not to have indulged this speculation and hope in the public interest. The Commission chose a speedy determination of an issue of great public interest in preference to the more patient consideration which the magnitude of the question warranted. To prohibit the broadcast of color in completely compatible systems, whether it is RCA or any other fully compatible system, is a bar to competition between compatible and incompatible color and is unreasonable and arbitrary.

It is my opinion the Commission's precipitous action in entering the order, the impact of which will require owners of television sets to install equipment at a cost of many hundreds of millions of dollars, and its refusal to hear additional evidence clearly indicates an abuse of discretion and constituted action which was arbitrary and capricious.

I would overrule the motion to dismiss and for a summary judgment and would restrain the enforcement of the order.

[fols. 2326-2327] IN THE UNITED STATES DISTRICT COURT, FOR THE NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION

No. 50-C-1459

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., and RCA VICTOR DISTRIBUTING CORPORATION, *Plaintiffs*,

vs.

UNITED STATES OF AMERICA and FEDERAL COMMUNICATIONS COMMISSION, *Defendants*

ORDER—December 22, 1950

This cause having come on to be heard on plaintiffs' motion for interlocutory injunction and for a temporary restraining order, and on defendants' motion for summary judgment and to dismiss the Complaint, and the Court having heard the arguments of counsel and having considered the briefs filed herein, and the Court being fully advised in the premises,

It is hereby ordered that the temporary restraining Order of the Commission of October 10, 1950, be and it hereby is continued in full force and effect until April 1, 1951, or until terminated by the Supreme Court of the United States, and the findings of fact and conclusions of law heretofore made in support of said temporary restraining order are hereby re-adopted.

It is further ordered that a summary judgment be and it hereby is entered in favor of the defendants and against the plaintiffs and the complaint is dismissed.

J. Earl Major, Judge, United States Court of Appeals, Seventh Circuit.

Philip L. Sullivan, Judge, United States District Court.

Dissenting: Walter J. La Buy, Judge, United States District Court.

[fols. 2328-2329] IN THE UNITED STATES DISTRICT COURT, FOR THE NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION

50-C-1459

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., and RCA VICTOR DISTRIBUTING CORPORATION,

vs.

UNITED STATES OF AMERICA and FEDERAL COMMUNICATIONS COMMISSION

COLUMBIA BROADCASTING SYSTEM, INC., *Party Defendant*

SIGHTMASTER CORP., WELLS-GARDNER & CO., RADIO CRAFTSMEN, INC., TELEVISION INSTALLATION SERVICE ASSOCIATION, PILOT RADIO CORPORATION, LOCAL 1031, INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS, AFL, and EMERSON RADIO & PHONOGRAPH CORP., *Intervening Plaintiffs*

ORDER—January 23, 1951

The Court being fully advised in the premises it is

Ordered that the order heretofore entered herein on January 19, 1951, be and it is hereby vacated and with the consent of the parties to this cause it is

Further ordered that the last paragraph of the order entered herein on December 22, 1950, be and it is hereby amended for the purpose of clarification, nunc pro tunc as of that date to read as follows:

> "It is further ordered that a summary judgment be and it is hereby entered in favor of the defendants and against the plaintiffs, including the plaintiff-intervenors, and that the complaints, including those of the plaintiff-intervenors, are dismissed."

[fol. 2330] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

PETITION FOR APPEAL—Filed January 25, 1951

To: The Hon. J. Earle Major, Circuit Judge for the Seventh Circuit; The Hon. Philip L. Sullivan, District Judge for the Northern District of Illinois; The Hon. Walter J. La Buy, District Judge for the said District.

Now come Radio Corporation of America, National Broadcasting Company, Inc. and RCA Victor Distributing Corporation, plaintiffs herein, and Emerson Radio & Phonograph Corporation, Pilot Radio Corporation, The Radio Craftsmen, Incorporated, Wells-Gardner & Co., Sightmaster Corporation, Local 1031, International Brotherhood of Electrical Workers, AFL, and Television Installation Service Association, plaintiff-interveners herein, and considering themselves aggrieved by the orders of this Court rendered and entered in the above entitled cause on the 22nd day of December, 1950, and the 23rd day of January, 1951, in so far as said orders entered summary judgment in favor of the defendants and against the plaintiffs, inclu ling the plaintiff-interveners, and dismissed the complaints, including those of the plaintiff-interveners, do hereby pray that an appeal be allowed to the Supreme Court of the United States from that part of said order because of errors prejudicial to plaintiffs and plaintiff-interveners which are set forth in the assignment of errors presented and filed herewith; that citation be issued in accordance with law; that an order be made fixing the amount [fol. 2331] of security which said plaintiffs and plaintiff-interveners shall give and furnish upon such appeal; and that the material parts of the record, proceedings and papers upon which said order was based, duly authenticated, be sent to the Supreme Court of the United States in accordance with the rules in such case made and provided.

Dated: January 25, 1951.

Respectfully submitted, Weymouth Kirkland; Kirkland, Fleming, Green, Martin & Ellis, By Howard Ellis, A Member of the Firm, Attorneys for Plaintiffs, Office and Post Office Address, 33 North La Salle Street, Chicago, Illinois.

Of Counsel: Cahill, Gordon, Zachry & Reindel, New York City, John T. Cahill, Joseph V. Heffernan, John W. Nields.

Nash, Ahern and McNally, By Thomas D. Nash, A Member of the Firm, Attorneys for intervener-plaintiff, Emerson Radio & Phonograph Corporation, Office and Post Office Address, 111 West Washington Street, Chicago, Illinois.

Of Counsel: Paul, Weiss, Rifkind, Wharton & Garrison, New York City, Simon H. Rifkind.

[fol. 2332] Schapiro and Schiff, By B. C. Schiff, A Member of the Firm, Attorneys for intervener-plaintiff, Pilot Radio Corporation, Office and Post Office Address: 38 South Dearborn Street, Chicago, Illinois.

Of Counsel: Mnuchin & Smith, New York City, Leon Mnuchin, Jerome S. Zurkow.

Kelly, Kelly & Kelly, By John J. Kelly, Jr., A Member of the Firm, Attorneys for intervener-plaintiff, The Radio Craftsmen, Incorporated, Office and Post Office Address: 111 West Washington Street, Chicago, Illinois.

Righeimer and Rigneimer, By Frank S. Righeimer, Jr., A Member of the Firm, Attorneys for intervener-plaintiff, Wells-Gardner & Co., Office and Post Office Address: 135 South La Salle Street, Chicago, Illinois.

Carl Pomerance, Attorney for intervener-plaintiff, Sightmaster Corporation, Office and Post Office Address: 135 South La Salle Street, Chicago, Illinois.

Jacobs and Kamin, By Alfred Kamin, A Member of the Firm, Attorneys for intervener-plaintiff, Local 1031, International Brotherhood of Electrical [fol. 2333] Workers, AFL, Office and Post Office Address: 201 North Wells Street, Room 1524, Chicago 6, Illinois.

Schradzke and Gould, By Gerald Ratner, Attorneys for intervener-plaintiff, Television Installation Service Association, Office and Post Office Address: 33 North La Salle Street, Chicago 2, Illinois.

[fols. 2333a-2334] [File endorsement omitted.]

[fols. 2335-2338] Bond on appeal for $250.00 approved and filed January 25, 1951, omitted in printing.

[fol. 2339] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

ASSIGNMENT OF ERRORS AND PRAYER FOR REVERSAL—Filed January 25, 1951

Radio Corporation of America, National Broadcasting Company, Inc. and RCA Victor Distributing Corporation, plaintiffs in the above entitled cause, and Emerson Radio & Phonograph Corporation, Pilot Radio Corporation, The Radio Craftsmen, Incorporated, Wells-Gardner & Co., Sightmaster Corporation, Local 1031, International Brotherhood of Electrical Workers, AFL, and Television Installation Service Association, plaintiff-interveners in the above entitled cause, in connection with their appeal to the Supreme Court of the United States, do hereby file the following assignment of errors upon which they will rely in their prosecution of said appeal from the orders of the statutory three-judge United States District Court for the Northern District of Illinois, Eastern Division, entered on the 22nd day of December, 1950, and the 23rd day of January, 1951, insofar as said orders entered summary judgment in favor of the defendants and against the plaintiffs, including the plaintiff-interveners, and dismissed the complaints, including those of the plaintiff-interveners.

Said Court erred:

1. In failing to hold that the findings of the Commission are not supported by substantial evidence.

2. In failing to hold that the conclusions of the Com-
[fol. 2340] mission are not supported by the findings or by substantial evidence.

3. In failing to hold that the Order of the Commission is not supported by the conclusions, by the findings, or by substantial evidence, and is not supported in law.

4. In failing to hold that the adoption by the Federal Communications Commission (herein called the "Commis-

sion") of commercial color television standards which are incompatible with existing black and white television standards * is beyond the jurisdiction of the Commission as contrary to the statutory standard of the "public convenience, interest or necessity", as violative of the Commission's statutory obligation to promote the "larger and more effective use of radio", and as not supported in the Communications Act of 1934, as amended, or otherwise.

[fol. 2341] 5. In failing to hold that the adoption by the Commission of commercial color television standards which are incompatible with existing black and white television

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* Incompatability means that the programs broadcast according to such incompatible color television standards may not be received by any of the black and white television receivers in the hands of the public (more than 9 million as of November, 1950) either in color or in black and white. As stated by the District Court:

> "* * * In order to receive a black and white picture [from the incompatible color system] it is necessary that a receiver be equipped with an adapter estimated to cost $50.00, plus the expense of installation. In other words, it would cost the American public nearly one-half billion dollars to equip existing sets to receive, under the proposed system, black and white pictures, and even then admittedly they would be of a grade inferior to present black and white pictures. In addition, in order to receive a picture in color, it will be necessary to add to an existing receiver a converter, estimated to cost about $100.00, plus the expense of installation. Thus, this will cost the public nearly one billion dollars. In other words, upon an expenditure by the public of one and one-half billion dollars, adapters and converters can be added to existing receivers so as to receive, under the proposed system, pictures in black and white and in color."

With a compatible color television system, on the other hand, all existing black and white receivers can receive compatible color television broadcasts, as a black and white picture, without any modification of the receiver whatever and without the degradation of picture quality involved in the incompatible system.

standards is arbitrary, capricious and an abuse of the Commission's discretion.

6. In failing to hold that the refusal of the Commission to permit the commercial broadcasting of compatible color television is beyond the jurisdiction of the Commission, as contrary to the statutory standard of the "public convenience, interest or necessity", as violative of the Commission's statutory obligation to promote the "larger and more effective use of radio", as beyond its authority to "regulate the kind of apparatus to be used with respect to its external effects and the purity and sharpness of the emissions from each station", and as not supported in the Communications Act of 1934, as amended.

7. In failing to hold that the refusal of the Commission to permit the commercial broadcasting of compatible color television is arbitrary, capricious and an abuse of the Commission's discretion.

8. In failing to hold that the promulgation of an order which the Commission stated was based in important respects on "speculation and hope", was arbitrary, capricious, an abuse of the Commission's discretion and contrary to law.

9. In failing to hold that findings with respect to critical aspects of a dynamic science were not supported by substantial evidence, where those findings were based upon early evidence superseded by evidence of later developments during the hearings which made the early evidence no longer representative of the facts.

[fol. 2342] 10. In failing to hold that the Commission wrongfully refused to make certain basic findings essential to a valid disposition of the question of commercial color television standards, which findings would require the adoption of compatible color television standards rather than the standards promulgated by the order.

11. In failing to hold that the refusal of the Commission to permit the commercial broadcasting of compatible color television systems is not supported by the Commission's conclusions or findings, or by the evidence.

12. In failing to hold that the Commission had no authority to suppress competition in television broadcasting by prohibiting the broadcasting of color by compatible systems, whether RCA or any other compatible system, in competition with incompatible color.

13. In failing to hold that the Commission violated its statutory obligation and was arbitrary and capricious in refusing to take account in its decision of facts of determinative significance although these facts were fully available to it.

14. In holding that the District Court was without authority to consider determinative events occurring after the hearings closed for the purpose of deciding whether the Commission wrongfully refused to consider these same facts before promulgating the order.

15. In failing to hold that the RCA Progress Report of July 31, 1950, which set forth certain of such determinative events, was a part of the administrative record and that the admitted refusal of the Commission to consider this report was in violation of the Administrative Procedure Act and the Communications Act of 1934, as amended.
[fol. 2343] 16. In failing to hold that the Report of the Advisory Committee on Color Television to the Committee on Interstate and Foreign Commerce of the United States Senate (the so-called Condon Committee Report) was a part of the administrative record and that the admitted refusal of the Commission to consider this Report was in violation of the administrative Procedure Act and the Communications Act of 1934, as amended.

17. In failing to hold that the Commission erred in denying the RCA Petition dated October 4, 1950, requesting the Commission to consider improvements in the performance of the RCA color television system, and to consider further all color television systems in order to obtain additional information, particularly when the Commission had stated in its First Report it should have such information before promulgating commercial color television standards.

18. In failing to hold that the order of the Commission is invalid because it was adopted without obtaining such additional information.

19. In failing to hold that it was illegal for the Commission to refuse to obtain such information because the television manufacturing industry could not agree to the unlawful and impossible conditions placed by the Commission upon the receipt of that information.

20. In failing to hold that the Commission's order is in-

valid in that it was based on the non-compliance by the television manufacturing industry with conditions which the Commission was without authority to impose.

21. In failing to hold that the Commission erred in permitting an engineer on the Commission's staff who had an interest in the adoption of an incompatible system to [fol. 2344] participate in the formulation and preparation of the Commission's reports and order complained of, and in relying on the advice of that interested staff engineer in adopting incompatible color television standards.

22. In failing to hold that the order of the Commission is contrary to the terms of the Commission's notice of July 11, 1949, pursuant to which the hearings on which the order purports to be based were held.

23. In failing to hold that the order of the Commission deprives the plaintiffs and plaintiff-interveners of property without due process of law, contrary to the Fifth Amendment to the Constitution of the United States.

24. In failing to vacate the order and send the proceedings back to the Commission for further consideration rather than allowing defendants' motion for summary judgment and dismissing the complaint.

25. In failing to rule on many determinative issues of law and fact, the decision of which are essential to the proper disposition of this appeal under Section 402(a) of the Communications Act of 1934, as amended.

26. In failing to hold that the Commission wrongfully refused to permit intervener-plaintiffs Emerson Radio & Phonograph Corporation and Wells-Gardner & Co. to intervene in the administrative proceedings and to present relevant evidence.

27. In granting the motion of defendant Federal Communications Commission to quash the subpoena duces tecum issued by the District Court at the request of intervener-plaintiff Pilot Radio Corporation and in refusing to consider the material called for in the subpoena.

28. In entering summary judgment in favor of the defendants and against the plaintiffs, including the plaintiff-interveners.

[fol. 2345] 29. In dismissing the complaint and the intervening complaint.

Wherefore, plaintiffs and plaintiff-interveners pray that the orders entered herein on the 22nd day of December, 1950, and the 23rd day of January, 1951, insofar as said orders entered summary judgment in favor of the defendants and against the plaintiffs, including the plaintiff-interveners, and dismissed the complaints, including those of plaintiff-interveners, be reversed, and that such other and further relief be granted as to the Court may seem just and proper.

Dated: January 25, 1951.

Weymouth Kirkland, Kirkland, Fleming, Green, Martin & Ellis, By Howard Ellis, A Member of the Firm, Attorneys for Plaintiffs, Office and Post Office Address: 33 North La Salle Street, Chicago, Illinois.

Of Counsel: Cahill, Gordon, Zachry & Reindel, New York City, John T. Cahill, Joseph V. Heffernan, John W. Nields.

[fol. 2346] Nash, Ahern and McNally, By Thomas D. Nash, A Member of the Firm, Attorneys for intervener-plaintiff, Emerson Radio & Phonograph Corporation, Office and Post Office Address: 111 West Washington Street, Chicago, Illinois.

Of Counsel: Paul, Weiss, Rifkind, Wharton & Garrison, New York City, Simon H. Rifkind.

Schapiro and Schiff, By B. E. Schiff, A Member of the Firm, Attorneys for intervener-plaintiff, Pilot Radio Corporation, Office and Post Office Address: 38 South Dearborn Street, Chicago 3, Illinois.

Of Counsel: Mnuchin & Smith, New York City, Leon Mnuchin, Jerome S. Zurkow.

Kelly, Kelly & Kelly, By John J. Kelly, Jr., A Member of the Firm, Attorneys for intervener-plaintiff, The Radio Craftsmen, Incorporated, Office and Post Office Address: 111 West Washington Street, Chicago, Illinois.

Righeimer and Righeimer, By Frank S. Righeimer, Jr., A Member of the Firm, Attorneys for intervenor-plaintiff, Wells-Gardner & Co., Office and

Post Office Address: 135 South La Salle Street, Chicago, Illinois.

[fol. 2347] Carl Pomerance, Attorney for intervenor-plaintiff, Sightmaster Corporation, Office and Post Office Address: 135 South La Salle Street, Chicago, Illinois.

Jacobs and Kamin, By Alfred Kamin, A Member of the Firm, Attorneys for intervener-plaintiff, Local 1031, International Brotherhood of Electrical Workers, AFL, Office and Post Office Address: 201 North Wells Street, Room 1524, Chicago 6, Illinois.

Schradzke & Gould, By Gerald Ratner, Attorneys for intervener-plaintiff, Television Installation Service Association, Office and Post Office Address: 33 North La Salle Street, Chicago 2, Illinois.

[fols. 2347a-2410] [File endorsement omitted.]

[fol. 2411] IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION

Civil Action No. 50-C-1459

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., and RCA VICTOR DISTRIBUTING CORPORATION, *Plaintiffs*,

against

UNITED STATES OF AMERICA and FEDERAL COMMUNICATIONS COMMISSION, *Defendants*.

ORDER ALLOWING APPEAL—January 25, 1951

Radio Corporation of America, National Broadcasting Company, Inc. and RCA Victor Distributing Corporation, plaintiffs herein, and Emerson Radio & Phonograph Corporation, Pilot Radio Corporation, The Radio Craftsmen, Incorporated, Wells-Gardner & Co., Sightmaster Corporation, Local 1031, International Brotherhood of Electrical Workers, AFL, and Television Installation Service Association, plaintiff-interveners herein, having made and filed their petition praying for an appeal to the Supreme Court

of the United States from the orders of this Court in this cause entered on December 22nd, 1950, and January 23, 1951, insofar as said orders entered summary judgment in favor of the defendants and against the plaintiffs, including the plaintiff-interveners, and dismissed the complaints, including those of the plaintiff-interveners, and having presented their assignment of errors and prayer for reversal and their statement as to the jurisdiction of the Supreme Court of the United States on appeal pursuant to the statutes and rules of the Supreme Court of the United States in such cases made and provided,

Now, therefore, it is hereby ordered that said appeal [fols. 2412-2418] be and the same hereby is allowed as prayed for and that the record on appeal be made and certified and sent to the Supreme Court of the United States in accordance with the rules of that Court.

It is further ordered that the amount of the appeal bond, to be approved by this Court, be and the same is hereby fixed in the sum of $250.

It is further ordered that citation shall issue in accordance with law.

J. Earl Major, Judge of the United States, Court of Appeals for the Seventh Circuit.

Philip L. Sullivan, Judge of the United States District Court.

——— ———, Judge of the United States District Court.

Dated: January , 1951.

[fols. 2419-2420] In the United States District Court

[Title omitted]

Order—January 25, 1951

In accordance with the provisions of the praecipe herein, and pursuant to the motion to transmit certain original documents on the appeal of the above entitled cause to the Supreme Court of the United States, it is

Ordered, that the original of all documents, transcripts, exhibits or other parts of this Court's records in the above entitled cause, of which there are no copies on file, may all

be forwarded in lieu of copies of such documents to the Clerk of the Supreme Court of the United States as part of the transcript of the record on the appeal herein.

Enter:

J. Earl Major, Judge of the United States Court of Appeals for the Seventh Circuit.

Philip L. Sullivan, Judge of the United States District Court.

———, Judge of the United States District Court.

Dated: January 25, 1951.

[fols. 2421-2423] Citation in usual form filed January 25, 1951, omitted in printing.

[fol. 2424] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

ADMISSION OF SERVICE OF PAPERS ON APPEAL—Filed January 25, 1951

Due and timely service of a copy of each of the following papers in the above entitled case is hereby admitted this 29th day of January, 1951:

1. Petition for Appeal.
2. Order Allowing Appeal.
3. Assignment of Errors and Prayer for Reversal.
4. Citation on Appeal.
5. Statement as to Jurisdiction.
6. Copy of Statement Required by Paragraph 2, Rule 12 of Rules of the Supreme Court of the United States.

Attorney General of the United States, By Anthony Scariand.

United States Attorney for the Northern District of Illinois, By Anthony Scariand.

Federal Communications Commission, By Anthony Scariand.

Arvey, Hodes & Mantynband, By George L. Siegel, Attorneys for Intervener-Defendant, Columbia Broadcasting System, Inc.

[fols. 2424a-2425] [File endorsement omitted.]

[fol. 2426] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

PRAECIPE—Filed January 25, 1951

To The Clerk of the United States District Court for the Northern District of Illinois, Eastern Division:

You will please prepare a transcript of the Record in the above entitled cause to be transmitted to the Clerk of the Supreme Court and include in said transcript the following:

1. Complaint and attached exhibits, filed by Radio Corporation of America, National Broadcasting Company, Inc., and RCA Victor Distributing Corporation on October 17, 1950.

2. Motion of plaintiffs for temporary injunction and other relief, and notice thereof to defendants, filed October 24, 1950.

3. Order of Hon. J. Earle Major convening statutory three-judge District Court.

4. Motions of defendants to dismiss the complaint or for summary judgment, filed October 30, 1950.

[fol. 2427] 5. Affidavit of Benedict P. Cottone in support of defendants' motions to dismiss or for summary judgment, filed October 30, 1950.

6. Record of proceedings before the Federal Communications Commission, Index thereto and Certificate of the Secretary of the Commission, attached as Appendix A to the affidavit of Benedict P. Cottone, filed October 30, 1950.

7. Motion of Pilot Radio Corporation to intervene as a plaintiff and notice thereof to plaintiffs and defendants, filed November 14, 1950.

8. Intervening complaint and exhibits of Pilot Radio Corporation filed November 14, 1950.

9. Motion of Columbia Broadcasting System, Inc., to intervene as a defendant and notice thereof to plaintiffs and defendants, filed October 30, 1950.

10. Motion of Columbia Broadcasting System, Inc. to dismiss the complaint or for summary judgment, filed October 30, 1950.

11. Affidavit of Adrian Murphy filed October 30, 1950.

12. Motion of Wells-Gardner & Co. to intervene as a plaintiff and notice thereof to the parties, filed November 10, 1950.

13. Intervening complaint of Wells-Gardner & Co. filed November 14, 1950.

14. Motion of Television Installation Service Association to intervene as a plaintiff and notice thereof to parties filed November 10, 1950.

[fol. 2428] 15. Intervening complaint of Television Installation Service Association filed November 14, 1950.

16. Subpoena Duces Tecum issued by the United States District Court, Northern District of Illinois, November 8, 1950.

17. Petition of Sightmaster Corporation for leave to intervene and notice thereof to parties filed November 10, 1950.

18. Intervening complaint of Sightmaster Corporation filed November 14, 1950.

19. Motion of The Radio Craftsmen, Incorporated to intervene as a plaintiff and notice thereof to parties filed November 10, 1950.

20. Intervening complaint of The Radio Craftsmen, Incorporated filed November 14, 1950.

21. Motion of Emerson Radio & Phonograph Corporation for leave to intervene and notice thereof to parties, filed November 14, 1950.

22. Pleading in intervention of Emerson Radio & Phonograph Corporation filed November 14, 1950.

23. Motion of Local 1031, International Brotherhood of Electrical Workers, AFL, to intervene as a plaintiff and notice thereof to parties, filed November 14, 1950.

2 . Intervening complaint of Local 1031, International Brotherhood of Electrical Workers, AFL, filed November 14, 1950.

25. Affidavits of C. B. Jolliffe, Walter A. Buck, John H. MacDonald and Walter M. Norton submitted on behalf of plaintiffs, filed November 9, 1950.

[fol. 2429] 26. Supplementary affidavit of Walter M. Norton with all annexes, filed on November 9, 1950.

27. Affidavit of Oscar Katz submitted on behalf of Columbia Broadcasting System, Inc., with exhibits, sworn to November 10, 1950.

28. Affidavit of Earl W. Muntz submitted on behalf of

Columbia Broadcasting System, Inc., with exhibits, sworn to November 8, 1950.

29. Affidavit of Herbert V. Akerberg submitted on behalf of Columbia Broadcasting System, Inc., sworn to November 10, 1950.

30. Affidavit of Samuel I. Rosenman submitted on behalf of Columbia Broadcasting System, Inc., with exhibits, sworn to November 10, 1950.

31. Affidavit of Frank Stanton submitted on behalf of Columbia Broadcasting System, Inc., with exhibits, sworn to November 10, 1950.

32. Motion to Quash and Response of Federal Communications Commission to Subpoena Duces Tecum, filed November 13, 1950.

33. Affidavit of Max Goldman submitted on behalf of defendants, filed November 13, 1950.

34. Correspondence concerning color television between Senator Edwin C. Johnson and Federal Communications Commission or its members with descriptive index and Federal Communications Commission's Secretary's Certificate, filed November 14, 1950; and similar correspondence between Senator Johnson and Columbia Broadcasting System, Inc., filed November 15, 1950.

[fol. 2430] 35. Affidavit of George H. Brown submitted on behalf of plaintiffs, sworn to November 13, 1950.

36. Affidavit of Milton Chasin submitted on behalf of plaintiffs, sworn to November 13, 1950.

37. Affidavit of Frank Perloff submitted on behalf of plaintiffs, sworn to November 13, 1950.

38. Affidavit of William Blank submitted on behalf of plaintiffs, sworn to November 13, 1950.

39. Affidavit of Harry Lefkowitz submitted on behalf of plaintiffs, sworn to November 13, 1950.

40. Affidavit of J. O. Reinecke submitted on behalf of Local 1031, International Brotherhood of Electrical Workers, AFL, filed November 13, 1950.

41. Affidavit of Richard L. Hirsch and Harold V. Levin submitted on behalf of Local 1031, International Brotherhood of Electrical Workers, AFL, filed November 13, 1950.

42. Order of District Court entered October 30, 1950 granting leave to intervene to Columbia Broadcasting System, Inc.

43. Orders of District Court dated November 14, 1950,

granting leave to intervene to (1) Wells-Gardner & Co., (2) Emerson Radio & Phonograph Corporation, (3) Local 1031, International Brotherhood of Electrical Workers, AFL, (4) Pilot Radio Corporation, (5) Television Installation Service Association, (6) The Radio Craftsmen, Incorporated, (7) Sightmaster Corporation.

44. Temporary restraining order by District Court entered on November 16, 1950, and Findings of Fact and [fol. 2431] Conclusions of law.

45. Affidavit of Isidor Goldberg submitted on behalf of intervener-plaintiff Pilot Radio Corporation, sworn to November 17, 1950, and attachments thereto.

46. Record of proceedings before the District Court on November 14, 15 and 16, 1950.

47. Briefs and/or memoranda submitted to the District Court on behalf of plaintiffs, intervener-plaintiff Emerson Radio & Phonograph Corporation, defendants and intervener-defendant Columbia Broadcasting System, Inc.

48. Opinions of District Court dated December 20, 1950.

49. Order of District Court entered December 22, 1950.

50. Order of District Court entered January 23, 1951.

51. Petition for appeal.

52. Assignment of errors and prayer for reversal.

53. Statement as to jurisdiction.

54. Order allowing appeal.

55. Statement required by Paragraph 2, Rule 12 of the Rules of the Supreme Court of the United States.

56. Order permitting transmission of original documents.

57. Citation on appeal.

58. Admission of service of papers on appeal.

59. The praecipe with acknowledgment of service and waiver.

60. Clerk's certificate.

Said transcript is to be prepared as required by law and the Rules of this Court and Rules of the Supreme Court [fol. 2432] of the United States, and is to be filed in the Office of the Clerk of the Supreme Court.

Dated: January 25, 1951.

Weymouth Kirkland, Kirkland, Fleming, Green, Martin & Ellis, By Howard Ellis, A Member of the Firm, Attorneys for plaintiffs, Office and P. O. Address: 33 No. La Salle Street, Chicago, Illinois.

Of Counsel: Cahill, Gordon, Zachry & Reindel, New York City, John T. Cahill, Joseph V. Heffernan, John W. Nields.

Nash, Ahern and McNally, By Thomas D. Nash, A Member of the Firm, Attorneys for intervener-plaintiff, Emerson Radio & Phonograph Corporation, Office and P. O. Address: 111 West Washington Street, Chicago, Illinois.

Of Counsel: Paul, Weiss, Kirkland, Wharton & Garrison, New York City, Simon H. Rifkind.

[fol. 2433] Schapiro and Schiff, By B. C. Schiff, A Member of the Firm, Attorneys for intervener-plaintiff, Pilot Radio Corporation, Office and P. O. Address: 38 South Dearborn Street Chicago 3, Illinois.

Of Counsel: Mnuchin & Smith, New York City, Leon Mnuchin, Jerome S. Zurkow.

Kelly, Kelly & Kelly, By John J. Kelly, Jr., A Member of the Firm, Attorneys for intervener-plaintiff, The Radio Craftsmen, Incorporated, Office and P. O. Address: 111 West Washington Street, Chicago, Illinois.

Righeimer and Righeimer, By Frank S. Righeimer, Jr., A Member of the Firm, Attorneys for intervener-plaintiff, Wells-Gardner & Co., Office and P. O. Address: 135 South La Salle Street, Chicago, Illinois.

Carl Pomerance, Attorney for intervener-plaintiff, Sightmaster Corporation, Office and P. O. Address: 136 South La Salle Street, Chicago, Illinois.

Jacobs and Kamin, By Alfred Kamin, A Member of the Firm, Attorneys for intervener-plaintiff, Local 1031, International Brotherhood of Electrical Workers, AFL, Office and P. O. Address: 201 North Wells Street, Room 1524, Chicago 6, Illinois.

[fol. 2434] Schradzke and Gould, By Gerald Ratner, Attorneys for intervener-plaintiff, Television Installation Service Association, Office and P. O. Address: 33 North La Salle Street, Chicago 2, Illinois.

Service of the above praecipe accepted and acknowledged. The defendants and the intervener-defendant waive their right to file a designation of additional portions of the record.

Attorney General of the United States, By Anthony Scariand, United States Attorney for the Northern District of Illinois, By Anthony Scariand, Federal Communications Commission, By Anthony Scariand, Arvey, Hodes and Mantynband, By George L. Siegel, Attorneys for intervener-defendant, Columbia Broadcasting System, Inc.

[fols. 2434a-2459] [File endorsement omitted.]

[fol. 2460] In the United States District Court

[Title omitted]

Supplement to Praecipe—Filed February 7, 1951

To the Clerk of the United States District Court for the Northern District of Illinois, Eastern Division:

You will please include in the transcript of the Record in the above entitled cause to be transmitted to the Clerk of the Supreme Court the following:

61. Appeal Bond.

Said transcript is to be prepared as required by law and the Rules of this Court and Rules of the Supreme Court of the United States, and is to be filed in the Office of the Clerk of the Supreme Court.

Dated: February 5, 1951.

Weymouth Kirkland, Kirkland, Fleming, Green, Martin & Ellis, By Weymouth Kirkland, A Member of the Firm, Attorneys for plaintiffs, Office and P. O. Address: 33 No. La Salle Street, Chicago, Illinois.

Of Counsel: Cahill, Gordon, Zachry & Reindel, New York City, John T. Cahill, Joseph V. Jeffernan, John W. Nields.

[fol. 2461] Nash, Ahern and McNally, By N. Hulbert, A Member of the Firm, Attorneys for intervener-plaintiff, Emerson Radio & Phonograph Corporation, Office and P. O. Address: 111 West Washington Street, Chicago, Illinois.

Of Counsel: Paul, Weiss, Rifkind, Wharton & Garrison, New York City, Simon H. Rifkind.

Schapiro and Schiff, By B. C. Schiff, A Member of the Firm, Attorneys for intervener-plaintiff, Pilot Radio Corporation, Office and P. O. Address: 38 South Dearborn Street, Chicago 3, Illinois.

Of Counsel: Mnuchin & Smith, New York City, Leon Mnuchin, Jerome S. Zurkow.

Kelly, Kelly & Kelly, By John J. Kelly, Jr., A Member of the Firm, Attorneys for intervener-plaintiff, The Radio Craftsmen, Incorporated, Office and P. O. Address: 111 West Washington Street, Chicago, Illinois.

Righeimer and Righeimer, By Alvah T. Martin, A Member of the Firm, Attorneys for intervener-plaintiff, Wells-Gardner & Co., Office and P. O. Address: 135 South La Salle Street, Chicago, Illinois.

[fol. 2462] Carl Pomerance, Attorney for intervener-plaintiff, Sightmaster Corporation, Office and P. O. Address: 135 South La Salle St., Chicago, Illinois.

Jacobs and Kamin, By Alfred Kamin, A Member of the Firm, Attorneys for intervener-plaintiff, Local 1031, International Brotherhood of Electrical Workers, AFL, Office and P. O. Address: 201 North Wells Street, Room 1524, Chicago 6, Illinois.

Schradzke and Gould, By Gerald Ratner, Attorneys for intervener-plaintiff, Television Installation Service Association, Office and P. O. Address: 33 N. La Salle Street, Chicago 2, Illinois.

Service of the above "Supplement To Praecipe" accepted and acknowledged. The inclusion of the appeal bond in the transcript of the record is hereby agreed to.

Attorney General of the United States, By Anthony Scariand, United States Attorney for the Northern District of Illinois, By Otto Keimer, Jr., Federal Communications Commission, By Anthony Scariand, Arvey, Hodes and Mantynband, By George L. Siegel, Attorneys for intervener-defendant, Columbia Broadcasting System, Inc.

[fols. 2462a-2463] [File endorsement omitted]

[fol. 2464] IN THE UNITED STATES DISTRICT COURT

[Title omitted]

ORDER—February 14, 1951

Pursuant to stipulation by and between the attorneys for the respective parties hereto, it is ordered that the following described documents which were filed with the Court and which, through clerical error have not been docketed in the office of the Clerk of the Court, may be docketed *nunc pro tunc* as of the filing date set forth in connection with the description of each of said documents, as follows:

Federal Communications Commissions' Response to Subpoena Duces Tecum and Motion to Quash, filed November 13, 1950.

Affidavit of Max Coleman in Opposition to Plaintiffs' Motion for Temporary Restraining Order, filed November 13, 1950.

Affidavit of George H. Brown, sworn to November 13, 1950, filed November 14, 1950.

Affidavit of Milton Chasin, sworn to November 13, 1950, filed November 14, 1950.

Affidavit of Frank Perloff sworn to November 13, 1950, filed November 14, 1950.

Affidavit of William Blank sworn to November 13, 1950, filed November 14, 1950.

Affidavit of Harry Lefkowitz sworn to November 13, 1950. filed November 14, 1950.

Philip L. Sullivan.

Enter:

—— ——, Judge.

[fol. 2465] UNITED STATES DISTRICT COURT

[Title omitted]

ORDER—February 14, 1951

On agreement of the parties by counsel now made in open court it is

Ordered that the Clerk of this Court be and he is hereby directed to correct a typographical error in the "Motion to Affirm", heretofore filed by the defendant, by striking the word "substantial" appearing in the last sentence of Footnote 2 and inserting in lieu thereof the word "insubstantial"

The Following are The Docket Entries to and Including February 14, 1951

50 C 1459

Three Judge Court
Judge J. Earl Major, Circuit Judge
Judge Philip L. Sullivan, District Judge
Judge Walter J. LaBuy, District Judge

Radio Corporation of America, National Broadcasting Co., Inc. and RCA Victor Distributing Corp.

Plaintiffs

(D)

vs.

United States of America and Federal Communications Commission.

Defendants.

Columbia Broadcasting System, Inc..

Party Defendant

Party Deft. given leave to intervene as per order of November 30, 1950.

SIGHTMASTER CORP., WELLS-GARDNER & CO., RADIO CRAFTSMEN INC., TELEVISION INSTALLATION SERVICE ASSOCIATION, PILOT RADIO CORPORATION, LOCAL 1031, INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS, AFL, and EMERSON RADIO & PHONOGRAPH

Intervening Plaintiffs as per orders of November 14, 1950

ATTORNEYS FOR PLAINTIFF

Kirkland, Fleming, Green, Martin & Ellis
33 N. La Salle St.

Attorneys for Defendants

(For U.S.A. & Federal Communications Commission)
Otto Kerner, Jr.
U. S. Attorney

(For Columbia Broadcasting Inc)
Arvey, Hodes & Mantynband
1 N. La Salle St.

(For Pilot Radio Corp. as Applicant for intervention)
Schaniss & Schiff
38 S. Dearborn St. (3)

ATTORNEYS FOR INTERVENING PLAINTIFFS.

(For SightMaster Corp.)
Carl Pomerance
135 S. La Salle St. (3)

(For Wells-Gardner & Co.)
Righheimer & Righheimer
135 S. La Salle St. (3)

(For Radio Craftsmen Corp.)
Kelly, Kelly & Kelly
111 W. Washington St. (2)

(For Television Installation)
Schradzke & Gould
33 N. La Salle St. (2)

(For Pilot Radio Corp.)
Schaniss & Schiff
First National Bk. Bldg. (3)

OVER

ADDITIONAL ATTORNEYS FOR
INTERVENING PLAINTIFFS

(For Local 1031, International
Brotherhood of Elec. Workers)
Jacobs & Kamin
201 N. Wells St. (6)

(For Emerson Radio Corp.)
Nash, Ahern & McNally
111 W. Washington St. (2)

D. C. Form No. 105A

JUDGE SULLIVAN

907

DOCKET CALENDAR

NO.	TITLE OF CASE	ATTORNEYS
	RADIO CORPORATION OF AMERICA NATIONAL BROADCASTING COMPANY, INC. and RCA VICTOR DISTRIBUTING CORPORATION Plaintiffs, against UNITED STATES OF AMERICA and FEDERAL COMMUNICATIONS COMMISSION, Defendants.	SEE PRECEDING PAGE FOR ATTORNEYS *For Plaintiff:* Kirkland, Fleming, Green, Martin & Ellis 33 North LaSalle St. RA 6-2929. *For Defendant:*

Nature of action: Suit to enjoin, set aside, annul and suspend a certain order of the Federal Communications Commission.

Jury trial demanded by

, 19

DATE	PLAINTIFF'S ACCOUNT	RECEIVED	DISBURSED	DATE	DEFENDANT'S ACCOUNT	RECEIVED	DISBURSED
10-7-58	K. F. L. & M. & E. Dep.	15 00					
JAN 13 1959	FEC. REPORT		15 00				
1-29-59	K. F. L. & M. & E. Appeal	5 00					

ABSTRACT OF COSTS		RECEIPTS, REMARKS, ETC.
TO WHOM PAID	AMOUNT	

2468

DATE	FILINGS—PROCEEDINGS	CLERK'S FEES PLAINTIFF	CLERK'S FEES DEFENDANT	AMOUNT REPORTED IN EMOLUMENT RETURNS
10-17-50	Filed complaint and ( ) copies (24) Exhs) (JS-5)	15 00		
10-17-50	Issued summons and (4) copies with ( ) copies of complaint.			
10-24-50	Fld. Motion of Pltfs. for Temporary injn. and other relief. (2)L			
" " "	Filed Notice of Motion for temp injn.,etc. (3)r			
" " "	Filed Certificate of Mailing by the Clerk. (1) r			
11-1-50	Fld. summons ret'd. served. 1 serv. $2.00 L			
10-30-50	Filed Notice, Motion to Intervene, Affidavit of Adrian Murphy and Stipulation. (10)			
" " "	Leave to Columbia Broadcasting System Inc. to intervene as party deft-DRAFT- (2)			
	Deft. Columbia Broadcasting System Inc. to file motion to dismiss and for summary judgment Nov. 14, 1950-Sullivan, J.			
" " "	Enter Order in reference to Exhibits, etc.-DRAFT-Sullivan, J. (2)			
" " "	Filed Notice of Motion. (1)			
" " "	Filed Affidavit of Robert D. Greenburg. (1)			
" " "	Filed Notice and Motion to Dismiss. (6)			
" " "	Filed Motion to Dismiss and in the Alternative for Summary Judgment and Affidavit of Benedict P. Cottone & 4 copies. (11)			
" " "	Motion for temporary or interlocutory injunction set for hrg. Feb. 14, 1951 at 10:30 a.m. before Judge Major, Luhby and Sullivan-Sullivan, J.			
" " "	Motion of Pilot Radio Corp. for permission to intervene as party plaintiff entered and cont'd. to Nov. 14, 1950-Sullivan, J.			
" " "	Order pltf. to file supporting affidavits ref motion for temporary injunction by Nov. 9, 1950; Deft. to file counter affidavits by Nov. 11, 1950-Sullivan, J.			
	Fld. notice to attys. 11-6-50. P			
	Filed Notice of U.S.C.A. signed by Hon. J. Earl Major designating three Judge Court.			
	Filed appearance of Pilot Radio Corp. as Applicant for Intervention. P			
	Filed affidavits of Plaintiffs, G. B. Jolliffe, Walter A. [illegible] and Walter H. Horton & 2 copies.			
	Filed affidavits of Plaintiffs-Supplementary Affidavit of Walter H. Horton.			
	Filed Notices. (2)			
	Filed Petition and 2 copies. (3)			
	Motion of Electrometer Corp. for leave to intervene entered and cont'd. to Nov. 14, 1950-Sullivan, J.			
	Fld. notice to attys. 11-10-50. P			
	Filed Notice and Affidavit of Dave Judge. (3)			
	Filed Motion to Intervene as Plaintiff. (3)			
	Motion of [illegible] Co. for leave to intervene entered and cont'd. to Nov. 14, 1950-Sullivan, J.			
	Fld. notice to attys. 11-10-50.			
	Filed Notice. (2)			
	Filed Motion to Intervene and copy of Intervening complt. (15)			
	Filed Notice for Temp. Injn. (1)			
	Motion of Television Installation Service Association to intervene as a plaintiff and motion to join in motion of original Pltfs. for temporary injunction entered and cont'd. to Nov. 14, 1950-Sullivan, J.			
	Fld. notice to attys. 11-10-50. P			

DATE	PROCEEDINGS	CLERK'S FEES PLAINTIFF	CLERK'S FEES DEFENDANT	AMOUNT REPORTED IN EMOLUMENT RETURNS
11-10-50	Filed Notice. (3)			
" " "	Filed Motion to Intervene, & 2 copies (3)			
" " "	Motion of the Radio Craftsmen, Inc. for leave to intervene entered and cont'd. to Nov. 14, 1950-Sullivan, J. Mld. notice to attys. 11-10-50. P			
11-10-50	Filed Affidavit of Simon H. Rifkind and Motion to Intervene. (8)			
" " "	Motion of Emerson Radio & Phonograph Corp. for leave to intervene entered and cont'd. to Nov. 14, 1950-DR FT-Sullivan, J. (2) Mld. notice to attys. 11-10-50. P			
11-13-50	Filed Affidavit of Intervenor Columbia Broadcasting System Inc. and Exhibits.			
" " "	Filed Affidavits of Richard L. Hirsch and Herold W. Levin. (13)			
" " "	Filed Affidavit of J. O. Reineke. (7)			
" " "	Filed Acknowledgment of Service and Proof of service. (2)			
" " "	Filed Affidavit of Service of Affidavits of Hirsch, Levin and Reinecke. (1)			
11-14-50	Filed Intervening Complaint of Wells Gardner & Co. (11)			
" " "	Leave to Wells Gardner Co. to intervene as pltf.-Js. Major, LaBuy and Sullivan Mld. notice to attys. 11-16-50. P			
11-14-50	Filed Notice. (3)			
" " "	Filed Motion to Intervene and Pleading of Intervention. (1) (8)			
" " "	Leave to Emerson Radio & Phonograph Corp. to intervene as party plaintiff-Js. Major, LaBuy and Sulli an Mld. notice to attys. 11-16-50.			
11-14-50	Filed Notice. (2)			
" " "	Filed Motion of Local 1031, etc. to intervene, and Complaint of Intervenor. (12)			
" " "	Leave to Local 1031 International Brotherhood of Electrical Workers to intervene as pltfs.-Js. Major, LaBuy & Sullivan Mld. notice to attys. 11-16-50. P			
11-14-50	Filed Notice. (2)			
" " "	Filed Motion to Intervene as Plaintiff. (3)			
" " "	Filed Intervenor's Complt. of Pilot Radio Corp. (10)			
" " "	Filed Exhibits A, B, C, D and E to Complt. of Pilot Corp.			
" " "	Leave to Pilot Radio Corp. to intervene-Js. Major, LaBuy and Sullivan. Mld. notice to attys. 11-16-50. P			
11-14-50	Filed Intervening complt. of Television Installation Service. (13)			
" " "	Leave to Television Installation Service Assn. to intervene as pltf.-Js. Major, Sullivan and LaBuy. Mld. notice to attys. 11-16-50. P			
11-14-50	Filed Intervening Complt. of Radio Craftsmen Inc. (10)			
" " "	Leave to the Radio Craftsmen Inc. to intervene as pltfs.-Js. Major, LaBuy and Sullivan Mld. notice to attys. 11-16-50. P			
11-14-50	Filed Intervening Complaint of Sightmaster Corp. (8)			
" " "	Leave to Sightmaster Corp. to intervene as pltf.-Js. Major, Sullivan and LaBuy Mld. notice to attys. 11-16-50. P			
11-14-50	Filed List of Printer's Errors in Exhibits annexed to complt. and in affidavits of pltf's. (4)			
11-14-50	Filed Proposed Complt. of Pilot Radio Corp. (11)			

DATE	FILINGS—PROCEEDINGS	CLERK'S FEES: PLAINTIFF	CLERK'S FEES: DEFENDANT	AMOUNT REPORTED IN EMOLUMENT RETURNS
11-14-50	Filed Materials referred to in "Response to Subpoena Duces Tecum and motion to quash Pilot Subpoena.			
11-15-50	Filed Exhibits of CBS. P			
11-16-50	Leave to Columbia Broadcasting System to file brief with respect to motion for temporary injunction and motion to dismiss or for summary judgment within five days from Nov. 15, 1950 and leave to pltfs. and pltf-intervenors to file replies to such brief within five days thereafter-Sullivan, J.			
	Mld. notice to attys. 11-16-50. P			
11-16-50	Arguments hrd. and motion for interlocutory injunction taken under advisement. Leave to any interested party to submit briefs in 5 days and reply briefs 5 days thereafter-Js. Major, LaBuy and Sullivan.			
" " "	Arguments hrd. and motion to dismiss and for summary judgment taken under advisement. Leave to any interested party to submit briefs in 5 days and reply briefs 5 days thereafter-Js. Major, LaBuy and Sullivan			
" " "	Enter Temporary Restraining Order and Findings of Fact and Conclusions of Law -DRAFT-Js. Major, LaBuy and Sullivan (6)			
	Mld. notice to attys. 11-16-50. P			
11-20-50	Filed Receipt for Exhibits of Pilot Radio Corp. (1)			
11-20-50	Filed Affidavit of Isidor Goldberg (Exhibits attached) (6)			
" " "	Filed Subpoena Duces Tecum ret'd. served as to Federal Communications Commission.			
" " "	Filed Subpoena Duces Tecum ret'd. served as to Columbia Broadcasting Co.			
" " "	Filed Affidavit of Service of Exhibits to proposed Complt. of Intervension of Pilot Radio Corp. (1)			
11-22-50	Filed Affidavit of Margaret Burke. (2)			
11-29-50	Filed Acknowledgment of Service of Brief. (2)P			
12-8-50	Filed Acknowledgment of Service of Affidavits. (3)P			
12-22-50	Filed Opinion of the Court. (17)			
" " "	Temporary Restraining Order entered Nov. 16, 1950 cont'd in full force and effect until April 1, 1951 or until terminated by Supreme Court of U. S. and order summary judgment entered in favor of defts. and complt. dismissed-DRAFT-Js. Sullivan and LaBuy (JS6) (1)			
	Mld. notice to attys. 12-22-50. P			15 00
12-26-50	Clerk's File Copy of Transcript of Proceedings of Oct. 30, 1950, filed by Official Reporter. (11)r			
1-5-51	Clerk's File Copy of Transcript of Proceedings of Nov. 14, 15, & 16, 1950, filed by Official Reporter. (379)r			
12-22-50	Issued C. C. of Opinion to P. C. C.	1	25 US	
1-19-51	Ordered that sum. Judgt. be and it is hereby entered in favor of the Defts. and against the plaintiff's including the Plf.'s intervenors & that complt. including those of the plf. intervenors are dismissed nunc pro tunc as of Dec. 22, 1950 - Js. Major, and Sullivan;			
	Mld. notc. to attys., 1-24-51.			

DATE	PROCEEDINGS	CLERK'S FEES PLAINTIFF	CLERK'S FEES DEFENDANT	AMOUNT REPORTER'S EMOLUMENTS RETAINED
1-23-51	Ordered that the order entered herein on January 19, 1951 be vacated and ordered with the consent of the parties to this cause that the last paragraph of the order entered herein on Dec. 22, 1950 be and it is hereby amended for the purpose of clarification, nunc pro tunc as of that date, to read as follows: "It is further ordered that a summary judgment be and it is hereby entered in favor of the defendants and against the plaintiffs, including the pltf-intervenors, and that the complaints including those of the pltf-intervenors, are dismissed."-Major, C. J. and Sullivan, D. J.			
	Mld. notice to attys. 1-26-51. P			
1-25-51	Filed Petition for Appeal by the Plaintiffs and Plaintiff-Intervenors. (4)	5 00 pd		
" " "	Filed Notice and Motion of plaintiffs for Transmittal of Original Documents. (4) (4)			
" " "	Order allowing Appeal; bond of $250.00; and Citation issue-DRAFT-(2) Plaintiffs Appeal bond in the sum of $250.00 approved and leave to Transmit original documents-DRAFT-Major, D. J. and Sullivan, D. J. (1)			
	Mld. notice to attys. 1-26-51. P			
1-25-51	Filed Appeal Bond in the sum of $250.00. (3)			
" " "	Filed Assignment of Errors & Prayer for Reversal. (9)			
" " "	Filed Statement required by Paragraph 2 Rule 12 of the Rules of the Supreme Court of United States. (4)			
" " "	Filed Praecipe. (9) P			
1-25-51	Filed Statement as to Jurisdiction. (27)			
1-25-51	Filed Citation on Appeal. (2)			
1-29-51	Filed Admission of Service of Papers on Appeal. (1)P			
2-5-51	Filed Motion to Affirm. (22)			
" " "	Filed Proof of Service of Motion to Affirm. (1) P			
2-7-51	Filed Supplement to Praecipe " (3) P			
" "	By agreement of counsel ordered that the Clerk of this U.S.District Court be and is hereby authorized and directed to correct a typographical error in the Statment as to Jurisdiction, heretofore filed herein by plaintiffs, by striking out the word "Committee" in the last line on page 16 thereof and inserting instead the word "Commission". Sullivan, J.			
	Mailed Notice to attys. 2-8-51 P			

(Entries Continued on Following Page)

50 C 1459

2-14-51	Filed Motion to Correct "Motion to Affirm".	(2)
" " "	By agreement of counsel, order that the Clerk of this Court is hereby directed to correct a typographical error in the "Motion to Affirm" heretofore filed by the defendants, by striking the word "substantial" in the last sentence of Footnote 2 and inserting in lieu thereof the word "insubstantial"- Sullivan, J.	
	Mld. notice to attys. 2-14-51.	
2-14-51	Filed Stip.	(4)
" " "	Leave to docket documents described in Draft Order submitted- DRAFT-Sullivan, J.	(1)
	Mld. notice to attys. 2-14-51.	
2-14-51	Filed Response to Subpoena Duces Tecum and Motion to Quash, nunc pro tunc Nov. 13, 1950.	(4)
" " "	Filed Affidavit of Max Goldman, nunc pro tunc Nov. 13, 1950.	(9)
" " "	Filed Affidavit of George H. Brown, nunc pro tunc Nov. 13, 1950.	(2)
" " "	Filed Affidavit of Milton Chasin, Harry Lefkowitz, William Blank and Frank Perloff, nunc pro tunc Nov. 13, 1950.	(8)P
2-14-51	Filed Exhibit "A" consisting of 27 Volumes of Transcripts Exhibits, Pleadings and other documents.	

2473-2474

[fol. 2475] Clerk's Certificate to foregoing transcript omitted in printing.

[fol. 2476] SUPREME COURT OF THE UNITED STATES, OCTOBER TERM, 1950

No. 565

[Title omitted]

STATEMENT OF POINTS TO BE RELIED UPON—Filed February 27, 1951

Appellants adopt for their statement of points upon which they intend to rely in their appeal to this Court the points contained in their Assignment of Errors heretofore filed.

Respectfully submitted, John T. Cahill, Counsel for Plaintiff-Appellants, Office and P. O. Address: 63 Wall Street, New York 5, New York.

Of Counsel: Weymouth Kirkland, Howard Ellis, Joseph V. Heffernan, John W. Nields.

[fol. 2477] Simon H. Rifkind, Counsel for Intervener-Appellant, Emerson Radio & Phonograph Corporation, Office and P. O. Address: 61 Broadway, New York, New York.

Of Counsel: Paul, Weiss, Rifkind, Wharton & Garrison, New York City.

B. C. Schiff, Counsel for Intervener-Appellant, Pilot Radio Corporation, Office and P. O. Address: 38 South Dearborn Street, Chicago, Illinois.

Of Counsel: Mnuchin & Smith, New York City, Schapiro and Schiff, Chicago, Illinois, Leon Mnuchin, Jerome S. Zurkow.

John J. Kelly, Jr., Counsel for Intervener-Appellant, The Radio Craftsmen, Incorporated, Office and P. O. Address: 111 West Washington Street, Chicago, Illinois.

Frank S. Righeimer, Jr., Counsel for Intervener-Appellant, Wells-Gardner & Co., Office and P. O.

Address: 135 South La Salle Street, Chicago, Illinois.

[fol. 2478] Carl Pomerance, Counsel for Intervener-Appellant, Sightmaster Corporation, Office and P. O. Address: 135 South La Salle Street, Chicago, Illinois.

Alfred Kamin, Counsel for Intervener-Appellant, Local 1031, International Brotherhood of Electrical Workers, AFL, Office and P. O. Address: 201 North Wells Street, Room 1524, Chicago 6, Illinois.

Gerald Ratner, Counsel for Intervener-Appellant, Television Installation Service Association, Office and P. O. Address: 33 North La Salle Street, Chicago 2, Illinois.

[fol. 2479] SUPREME COURT OF THE UNITED STATES, OCTOBER TERM, 1950

No. 565

[Title omitted]

STIPULATION DESIGNATING PARTS OF THE RECORD TO BE PRINTED—Filed February 27, 1951

The parties to the above entitled cause hereby stipulate that the following parts of the record should be printed by the Clerk of the Supreme Court:

The entire record on appeal, except:

(a) Record of proceedings before the Federal Communications Commission, Index thereto and Certificate of the Secretary of the Commission, attached as Appendix A to the affidavit of Benedict P. Cottone, filed October 30, 1950. (Praecipe, Item 6)

(b) Correspondence concerning color television between Senator Edwin C. Johnson and Federal Communications Commission or its members with descriptive index and Federal Communications Commission's Secretary's Certificate, [fol. 2480] filed November 14, 1950; and similar correspondence between Senator Johnson and Columbia Broad-

casting System, Inc., filed November 15, 1950. (Praecipe, Item 34)

(c) Record of proceedings before the District Court on November 14, 15 and 16, 1950. (Praecipe, Item 46)

(d) Briefs and/or memoranda submitted to the District Court on behalf of plaintiffs, intervener-plaintiff Emerson Radio & Phonograph Corporation, defendants and intervenor-defendant Columbia Broadcasting System, Inc. (Praecipe, Item 47)

The parties to the above entitled cause hereby further stipulate that those parts of the record which are not printed may be referred to by any of the parties in their briefs as though they had been printed, and they further stipulate that such proceedings before the Federal Communications Commission as are incorporated by reference in the record of proceedings attached as Appendix A to the affidavit of Benedict P. Cottone filed October 30, 1950 in the District Court may also be referred to in the same manner.

Respectfully submitted, John T. Cahill, Counsel for Plaintiff-Appellants, Office and P. O. Address: 63 Wall Street, New York 5, N. Y.

Of Counsel: Weymouth Kirkland, Howard Ellis, Joseph V. Heffernan, John W. Nields.

[fol. 2481] Simon H. Rifkind, Counsel for Intervener-Appellant, Emerson Radio & Photograph Corporation, Office and P. O. Address: 61 Broadway, New York, N. Y.

Of Counsel: Paul, Weiss, Rifkind, Wharton & Garrison, New York City.

B. C. Schiff, Counsel for Intervener-Appellant, Pilot Radio Corporation, Office and P. O. Address: 38 South Dearborn Street, Chicago, Illinois.

Of Counsel: Mnuchin & Smith, New York City, Schapiro and Schiff, Chicago, Illinois, Leon Mnuchin, Jerome S. Zurkow.

John J. Kelly, Jr., Counsel for Intervener-Appellant, The Radio Craftsmen, Incorporated, Office and P. O. Address: 111 West Washington Street, Chicago, Illinois.

Frank S. Righeimer, Jr., Counsel for Intervener-Appellant, Wells-Gardner & Co., Office and P. O. Address: 135 South La Salle Street, Chicago, Illinois.

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Gerald Ratner, Counsel for Intervener-Appellant, Television Installation Service Association, Office and P. O. Address: 33 North La Salle Street, Chicago 2, Illinois, Philip B. Talman, Solicitor General, Max Goldman, Assistant General Counsel, Federal Communications Commission, Richard Holbert, Counsel for Intervener-Appellee, Columbia Broadcasting System, Inc.

Approved: —— ——.

[fol. 2482a] [File endorsement omitted.]

[fol. 2483] SUPREME COURT OF THE UNITED STATES, OCTOBER TERM, 1950

No. 565

[Title omitted]

ORDER NOTING PROBABLE JURISDICTION AND ASSIGNING CAUSE FOR ARGUMENT, ETC.—March 5, 1951.

The statement of jurisdiction in this case having been submitted and considered by the Court, probable jurisdiction is noted and the case is assigned for argument on March 26, 1951. The motion to dispense with printing part of the record is granted.

[Endorsed on Cover]: Enter, John T. Cahill, File No. 55071, Northern Illinois Term No. 565, Radio Corporation

of America, National Broadcasting Company, Inc., RCA Victor Distributing Corporation, et al., Appellants, vs. The United States of America, Federal Communications Commission and Columbia Broadcasting System, Inc., Filed February 19, 1951, Term No. 565 O. T. 1950.

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SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1950

Office-Supreme Court, U. S.
FILED
FEB 19 1951
CHARLES ELMORE CROPLEY
CLERK

No. 565

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., RCA VICTOR DISTRIBUTING CORPORATION, ET AL., *Appellants*,

vs.

THE UNITED STATES OF AMERICA, FEDERAL COMMUNICATIONS COMMISSION, AND COLUMBIA BROADCASTING SYSTEM, INC.

APPEAL FROM THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF ILLINOIS

STATEMENT AS TO JURISDICTION

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INDEX

Subject Index

	Page
Statement as to jurisdiction	1
Opinions below	1
Jurisdiction	2
Statutes involved	2
Statement	2
Questions presented	9
The questions are substantial	11
Appendix "A"—Opinions, orders, findings of fact and conclusions of law of the United States District Court	26
Appendix "B"—Text of statutes involved	53

Table of Cases Cited

Columbia Broadcasting System, Inc., v. *United States*, 316 U. S. 407	2
Interstate Commerce Commission v. *Oregon-Washington R. Co.*, 288 U. S. 14	2
National Broadcasting Company v. *United States*, 319 U. S. 190	2, 13, 19
Texas & Pacific Ry. Co. v. *United States*, 289 U. S. 627	2
United States v. *Carolina Freight Carriers Corp.*, 315 U. S. 475	2
United States v. *Hancock Truck Lines, Inc.*, 324 U. S. 774	2

Statutes Cited

Administrative Procedure Act:	
Section 4	2
Section 10	2
Communications Act of 1934:	
Section 303(c)	2
Section 303(e)	2

Page

Section 303(f) 2
Section 303(g) 2
Section 402(a) 2

United States Code, Title 28 (Judicial Code):

Section 1253 2
Section 1336 ..... 2, 7
Section 1398 7
Section 2101(b) 2
Section 2284 7
Section 2321 7
Section 2322 7
Section 2323 ..... 2, 7
Section 2324 7
Section 2325 7

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS,
EASTERN DIVISION

Civil Action No. 50C1459

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC. AND RCA VICTOR DISTRIBUTING CORPORATION, *Plaintiffs,*

against

UNITED STATES OF AMERICA AND FEDERAL COMMUNICATIONS COMMISSION,

Defendants.

STATEMENT AS TO JURISDICTION

In compliance with Rule 12 of the Rules of the Supreme Court of the United States, as amended, plaintiffs-appellants and intervener-appellants respectfully submit herewith their statement particularly disclosing the basis upon which the Supreme Court has jurisdiction on appeal to review the orders of the statutory three-judge District Court of the United States for the Northern District of Illinois, Eastern Division, entered in this cause.

Opinions Below

The majority and dissenting opinions of the District Court are not yet reported. A copy of the opinions and

orders and of the findings of fact and conclusions of law and order in connection with the stay are attached hereto as Appendix A.

Jurisdiction

The orders of the District Court were entered on December 22, 1950, and January 23, 1951. A joint petition for appeal is presented to the said District Court herewith, to wit, on January 25, 1951. The jurisdiction of the Supreme Court of the United States to review this decision by direct appeal is conferred by Title 28, United States Code, Sections 1253 and 2101(b). The following decisions sustain the jurisdiction of the Supreme Court to review the order on direct appeal of this case: *Columbia Broadcasting System, Inc.* v. *United States*, 316 U. S. 407 (1942); *National Broadcasting Company* v. *United States*, 319 U. S. 190 (1943); *United States* v. *Carolina Freight Carriers Corp.*, 315 U. S. 475 (1942); *United States* v. *Hancock Truck Lines, Inc.*, 324 U. S. 774 (1945); *Texas & Pacific Ry. Co.* v. *United States*, 289 U. S. 627 (1933); *I.C.C.* v. *Oregon-Washington R. Co.*, 288 U. S. 14 (1933).

Statutes Involved

Sections 303(c), (e), (f) and (g) and 402(a) of the Communications Act of 1934, as amended (48 Stat. 1082, 1093; 50 Stat. 197; 63 Stat. 108; 47 U. S. C. § 303(c), (e), (f), (g); 402(a); Sections 1253, 1336 and 2323 of the Judicial Code (62 Stat. 928, 931, 970; 63 Stat. 105; 28 U.S.C. § 1253, 1336, 2323); and Sections 4 and 10 of the Administrative Procedure Act (60 Stat. 238, 243; 5 U.S.C. § 1003, 1009) are set forth in Appendix B hereto.

Statement

Plaintiffs-appellants are Radio Corporation of America, National Broadcasting Company, Inc., and RCA Victor

Distributing Corporation (hereinafter referred to as "RCA", "NBC" and the "Distributing Corporation"). RCA is engaged, among other things, in research and development work in the field of electronics and particularly in the field of radio and television, both black and white and color. RCA is also engaged in the manufacture and sale of radio and television transmitting and receiving apparatus and tubes. NBC is engaged in sound and television broadcasting and in sound and television network broadcasting. The Distributing Corporation is engaged in the sale of television receivers and other products manufactured by RCA Victor Division, the manufacturing division of RCA, to dealers located in Chicago and other cities.

Intervener-appellants are Emerson Radio & Phonograph Corporation, Pilot Radio Corporation, The Radio Craftsmen, Incorporated, and Wells-Gardner & Co., manufacturers of radio and television receivers and equipment; Sightmaster Corporation, which was also a manufacturer of television receivers and equipment until production was discontinued by reason of the Order of the Federal Communications Commission (hereinafter referred to as the "Commission") under review; Local 1031, International Brotherhood of Electrical Workers, AFL, a labor union whose members are primarily employed by manufacturers of television receivers, parts and equipment; and Television Installation Service Association, an association of small business men engaged in the installation and servicing of television receivers.

On July 11, 1949, the Commission issued a Notice in which it proposed to hold a rule-making hearing to consider, among other things, color television systems, provided that such color systems met two criteria: First, that they could operate in the television channel 6 megacycles in width which is now used for black and white television, and,

second, that the television signals transmitted according to the color system could be received on existing television receivers "simply by making relatively minor modifications in such existing receivers."

Pursuant to this Notice and the various amendments thereto, a hearing was held before the Commission *en banc* commencing September 26, 1949 and continuing intermittently until May 26, 1950. During the course of these hearings evidence was presented to the Commission with respect to three proposed color television systems, each of which can operate in a 6-megacycle channel. The three color systems were those proposed by RCA, by Color Television Incorporated, and by Columbia Broadcasting System, Inc. (hereinafter called "CBS").

The system proposed by RCA is compatible with present black and white standards. Signals sent by a compatible color system can be received as black and white pictures on all existing television sets without making any modification in the sets. The CBS system is incompatible. Existing receivers can get no picture whatsoever from the incompatible CBS signals without extensive and expensive adaptation.[1]

On September 1, 1950, the Commission issued its "First Report of Commission (Color Television Issues)", together with a "Second Notice of Further Proposed Rule-Making." In this Report the Commission did not adopt standards for any of the proposed color television systems. The Report found defects in all three proposed systems, and concluded that the Commission should allow more time for the development of all color systems. The Commission, however, conditioned the allowance of this additional time upon the acceptance by the television industry of two conditions:

(1) The first condition was that the television receiver

[1] No system proposed can produce a color picture on existing receivers without conversion.

manufacturing industry, over which the Commission has no jurisdiction, agree to build all future receivers in accordance with detailed specifications prescribed by the Commission, which would require extensive redesign of present production receiver models. These so-called "bracket standards" receivers would have to be so constructed that they could receive black and white pictures of either 525 lines, 60 fields per second (the existing standard, and the standard used by the RCA system), or 405 lines, 144 fields per second (which would be required for the reception of the CBS system), or any other combination of lines and fields within widely separated limits.

(2) The other condition imposed by the Commission was that the industry, broadcasters as well as manufacturers, acquiesce in such a drastic change in the existing black and white transmission standards *without a hearing.* This condition was prescribed in spite of the fact that the existing standards had been in effect since 1941, and no proposal for any such change had been made in the hearings.

The Commission also stated in its First Report that unless the industry accepted these two conditions it would forthwith adopt the CBS system.

The parties to the proceedings and the industry at large were requested to file comments by September 29, 1950.

With minor exceptions, those of the television manufacturing industry who submitted comments stated that to change their production of black and white receivers so as to conform to the Commission's specifications was impractical, unnecessarily costly to the public, and could not be done in accordance with the time schedule set by the Commission.

The RCA Comments included the Report of the Advisory Committee on Color Television to the Committee on Interstate and Foreign Commerce of the United States Senate

(the so-called Condon Committee Report), issued on July 10, 1950, and the RCA "Progress Report on Color Television and UHF" which had been submitted to the Commission on July 31, 1950.

The Condon Committee Report contained a detailed and scientific analysis of the three proposed color television systems which was substantially at variance with the First Report of the Commission. The RCA Progress Report set forth the developments and improvements in the RCA system which had taken place since the closing of the hearings on May 26, 1950.

On October 4, 1950, RCA filed a Petition with the Commission requesting the Commission to consider improvements in the performance of the RCA color television system, and to consider further all color television systems in order to obtain the additional information which the Commission stated in its First Report it should have before promulgating commercial color television standards, without insisting upon the two illegal and impossible conditions proposed with respect to bracket standards.

On October 10, 1950, the Commission, without any further hearings and without taking any additional evidence, denied the RCA Petition and adopted its Second Report. In its Second Report the Commission reaffirmed its First Report and concluded, without looking at them, that no improvements in the RCA or other compatible systems warranted a reopening of the record.

Simultaneously with the issuance of its Second Report, the Commission issued its Order, effective November 20, 1950—the Order here under review. By this Order the Commission promulgated commercial color television standards which adopt the CBS color television system on an exclusive basis. The effect of this Order is to prohibit the commercial broadcast of all other color television systems.

Plaintiffs-appellants brought this suit in the United States District Court for the Northern District of Illinois, Eastern Division, pursuant to the provisions of the Communications Act of 1934, as amended (48 Stat. 1064, 1093 and 63 Stat. 108; 47 U.S.C. § 402(a)) and of Title 28 United States Code (62 Stat. 931, 936, 968, 969; 63 Stat. 105; 28 U.S.C. §§ 1336, 1398, 2284, 2321-25) and Section 10 of the Administrative Procedure Act (60 Stat. 243; 5 U.S.C. § 1009), to enjoin, set aside, annul and suspend the Commission's Order. CBS, by agreement of the parties, was allowed to intervene in support of the Commission's Order. The intervener-appellants were permitted by the District Court, over objection of defendants, to intervene in support of plaintiffs' attack upon the Commission's Order.

Plaintiffs sought both an interlocutory and a permanent injunction. In the motion by plaintiffs for an interlocutory injunction, the District Court was also asked to issue a temporary restraining order in the event it was unable to decide plaintiffs' motion before November 20, 1950, the effective date of the Commission's Order.

Defendants moved for summary judgment and dismissal of the complaint on the ground that there was no genuine issue as to any material fact and that defendants were entitled to judgment as a matter of law.

A three-judge court was convened as required by Title 28, United States Code, Sections 2284 and 2325 (62 Stat. 968, 970). On the issues thus presented, the matter came on for hearing and oral argument was heard on November 14, 15, and 16, 1950.

Numerous affidavits were presented by the plaintiffs, as well as by the intervener-appellants, showing that irreparable damage would result if the Order was permitted to take effect. Plaintiffs' affidavits also set forth the various determinative facts which the Commission should have

considered before promulgating commercial standards for color television and, in addition, set forth the grounds upon which plaintiffs contend that the Commission erred in permitting an interested staff engineer to continue in the proceedings after his interest had been disclosed and objected to.

Opposing affidavits were filed by the defendants and by CBS, the defendant-intervener. There was also presented by the Commission a record of the proceedings held prior to the issuance of its Order.

At the conclusion of the hearing, the Court took the conflicting motions under advisement and at the same time entered a temporary restraining order "restraining and suspending until further order of this court the promulgation, operation and execution of the order of the Federal Communications Commission adopted October 10, 1950, effective November 20, 1950." The Court also made the findings of fact and conclusions set forth in Appendix A hereto.

On December 22, 1950, and January 23, 1951, the District Court entered orders granting summary judgment in favor of the defendants and against the plaintiffs, including the plaintiff-interveners, and dismissing the complaints, including the intervening complaints. One judge dissented. The Court unanimously continued in effect the temporary restraining order until April 1, 1951, or until terminated by the Supreme Court. The Court also unanimously readopted the findings and conclusions theretofore made in support of the temporary restraining order.

That part of the District Court's opinion which states the basis for its order reads as follows:

> "Thus, as we evaluate the situation, there are two courses open, (1) to allow defendants' motion for a summary judgment, and (2) to vacate the order and

send the proceeding back to the Commission for further consideration in view of recent developments in the color television field as well as the rapidly changing economic situation. A pursuance of the latter course, assuming we have such authority, of which there may be doubt, would inevitably result in the prolongation of the controversy which badly needs the finality of decision which can be made only by the Supreme Court. In other words, the interests of all, so we think, will be better served with this controversy on its way up rather than back from whence it comes."

Questions Presented

1. Whether the District Court erred in failing to hold that the Federal Communications Commission violated the Administrative Procedure Act in refusing to consider relevant matter presented.

2. Whether the District Court erred in failing to hold that it was unlawful for the Commission to base its Order in important respects on "speculation and hope," and to refuse properly to inform itself.

3. Whether the District Court erred in failing to hold that it was unlawful for the Commission to base findings with respect to critical aspects of a dynamic science upon early evidence which was superseded during the hearings by later evidence that made the early evidence no longer representative of the facts.

4. Whether the District Court erred in failing to hold that the Order, conclusions and findings of the Commission were not based on substantial evidence.

5. Whether the District Court erred in holding that it was without power to consider relevant matter presented to the Commission, and which the Commission refused to consider, for the purpose of determining whether such evidence should have been considered by the Commission.

6. Whether the District Court erred in failing to rule on

many determinative issues of law and fact (including the issue of whether the Commission's Order was supported by substantial evidence), the decision of which is essential to the proper disposition of the appeal, and in referring the decision of such issues to the Supreme Court, stating that it could not see "why we should devote the time and energy which the importance of the case merits, realizing as we must that the controversy can only be finally terminated by a decision of the Supreme Court."

7. Whether the District Court erred in failing to hold that it was unlawful for the Commission to adopt standards for the broadcasting of color signals from which no picture whatsoever can be received on the television sets now in the hands of the public.

8. Whether the District Court erred in failing to hold that it was unlawful for the Commission to suppress competition by prohibiting the broadcasting of color signals which can be received on all existing black and white receivers as black and white pictures (compatible color), while permitting broadcasting of color signals which cannot be received on existing television sets (incompatible color).

9. Whether the District Court erred in failing to hold that it was unlawful for the Commission to base its Order on the non-compliance by the television industry with conditions which the Commission was without authority to impose.

10. Whether the District Court erred in failing to hold that the Commission abused its discretion and was arbitrary and capricious in adopting the incompatible color television standards over the virtually unanimous opposition of technical and engineering experts of the industry as well as of independent experts, without taking account of expert and impartial analysis and opinion fully avail-

able to it, without considering various improvements in compatible systems which took place after the close of the administrative hearings, and with the participation of a Commission engineer having an interest in the adoption of an incompatible system.[2]

The Questions Are Substantial

1. The instant case presents a substantial and important question with respect to the construction of the Administrative Procedure Act. The question is of general interest concerning not only the practices of the Federal Communications Commission but other federal administrative agencies as well.

With respect to rule-making proceedings of administrative agencies—which the color television proceedings before the Commission were—the Administrative Procedure Act, Section 4(b), provides in pertinent part (60 Stat. 239; 5 U.E.C. § 1003(b)):

> "After notice required by this section, the agency shall afford interested persons an opportunity to participate in the rule making through submission of written data, views, or arguments with or without opportunity to present the same orally in any manner; and, after consideration of all relevant matter presented, the agency shall incorporate in any rules adopted a concise general statement of their basis and purpose."

Appellants contend that this statutory requirement means just what it says—that the agency shall *consider "all relevant matter presented."* This is precisely what the Commission refused to do in the instant case.

Plaintiff RCA, in response to a request by the Commission that comments be submitted, on September 28, 1950

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[2] All other points set forth in the Assignment of Errors and Prayer for Reversal are also presented.

filed with the Commission its Comments. These included, among other matters, the RCA Progress Report and the Report of the Condon Committee.

The first of these two reports showed that RCA had made such improvements in its color television system that certain criticisms which the Commission had leveled at the system were without merit.

The second of these reports was prepared by the Condon Committee which had been organized at the request of the Chairman of the Senate Committee on Interstate and Foreign Commerce to give "sound, impartial, scientific advice" on color television. The conclusions of this group of eminent, independent scientists were at substantial variance with the findings and conclusions upon which the Commission seeks to justify its Order.

The defendants have not contended that the RCA Progress Report and the Condon Committee Report were not *relevant* to the issues before the Commission. Nor has it been contended that the reports were not *presented* to the Commission. The Commission nevertheless refused to consider these reports.

In these circumstances, appellants submit that the Commission's refusal to consider the reports was unwarranted and that the Commission had the positive statutory duty to consider them.

2. The instant case presents an important and substantial question with respect to the duties of the Commission as set forth in the Communications Act of 1934, as amended. The question is whether it is lawful for the Commission to fail properly to inform itself and, in addition, to base its administrative determination in important respects on "speculation and hope."

The Communications Act of 1934, as amended, Section 303(g), provides that the Commission shall

> "Study new uses for radio, . . . and generally encourage the larger and more effective use of radio in the public interest."

The Supreme Court has held that this statutory directive imposes a "comprehensive mandate" upon the Commission. *National Broadcasting Company, Inc.* v. *United States*, 319 U. S. 190, 219 (1943). This mandate clearly includes the duty to inform itself adequately with respect to issues before it for determination. Indeed, the Commission's duty to keep itself fully informed has been recognized by the Commission itself in its heretofore consistent administrative practice and has been explicitly stated by the Commission as follows:

> "It would be a violation of its statutory obligations for the Commission to disregard any facts which might foreclose a proper exercise of its duty to fix transmission standards . . . "[3]

Notwithstanding its statutory obligations, the Commission refused to consider at all such clearly relevant matters as the RCA Progress Report and the Report of the Condon Committee. In addition, when plaintiff RCA formally petitioned the Commission to consider improvements in the RCA color television system and to consider further all color television systems in order to obtain the additional information which the Commission stated in its First Report it should have before promulgating color television standards, the petition was denied. On the same day, the Commission issued the Order here under review and stated in its Second Report:

> "None of the . . . improvements in systems . . . warrant reopening of the hearing."

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[3] FCC Report of May 28, 1940, In the Matter of Order No. 65 Setting Television Rules and Regulations for Hearing in FCC Docket No. 5806, p. 19.

This conclusion the Commission reached without even looking at the improvements of which it spoke—without informing itself as to the facts. The District Court stated in this regard,

> " . . . as we view the situation the most plausible contention made by plaintiffs is that the Commission abused its discretion in refusing to extend the effective date of its order so that it might further consider the situation, and particularly the improvement which it is claimed had been made by RCA and others."

Instead, the Commission decided to and did admittedly base its Order in important respects on "speculation and hope." Judge LaBuy in dissenting from the decision of the District Court, stated:

> " . . . it is difficult to understand why the Commission refused to hear additional evidence and chose instead a course of action, using its own words, based 'on speculation and hope rather than on demonstration.' "

This, Judge LaBuy considered "an abuse of discretion and constituted action which was arbitrary and capricious."

Appellants submit that the failure and refusal of the Commission to inform itself violated its statutory duties.

3. Proceedings of this kind are unique in that they involve a dynamic and rapidly progressing science. It is inherent in such a situation that later facts will in many instances entirely supersede earlier facts, and when they do the earlier facts are of no probative significance whatever. In view of this, findings with respect to critical aspects of such a science based upon early evidence which was superseded during the hearings by later evidence cannot be findings supported by substantial evidence.

The Commission has conceded that great technical strides were made during the nine-month course of the hearings

from September 26, 1949 to May 26, 1950. Yet in arriving at some of its critical findings the Commission relied upon testimony adduced in 1949 as to defects in RCA equipment which, by the 1950 stage of the hearings, had been replaced by improved apparatus that eliminated these defects.

Under the circumstances, appellants submit that evidence not relevant to the improved apparatus at the time the hearings closed cannot constitute substantial evidence. Appellants contend that the Commission's reliance upon obsolete evidence was arbitrary and unlawful.

4. The findings and the conclusions of the Commission are not supported by substantial evidence either with respect to the RCA system or with respect to the CBS system.

It has been pointed out under the preceding point that many of the findings of the Commission relating to the RCA system were based upon evidence which had been superseded in the record before the administrative hearings were closed. It is clear that findings based on superseded evidence are in no sense findings based upon substantial evidence.

Conversely, in the case of findings relating to the CBS system, the Commission's First Report clearly recognized that with respect to each of the seven performance characteristics considered, further information was needed. Yet the Commission 40 days later adopted the CBS system without obtaining the information which it had recognized was necessary. Appellants respectfully submit that these findings also cannot be said to be supported by substantial evidence.

In this connection it is significant to note that the District Court did not find that the Order, conclusions or findings of the Commission were supported by substantial evidence.

5. The District Court should have considered the evidence submitted to the Commission for the purpose of

deciding whether the Commission had wrongfully refused to look at such evidence. With respect to the contention that the Commission violated its statutory obligations in refusing to take account of pertinent information submitted to it after the close of the hearings and in refusing to look at subsequent developments of determinative significance, the majority of the District Court stated:

> " . . . a number of critical findings are based upon evidence which was taken in the earlier stage of the proceeding which is not representative of the situation as it existed at the time the findings were adopted. Admittedly, much progress was made during the latter portion of the hearings and, as claimed, after the hearings closed, in the development of a compatible system of color television. Particularly was such progress made by RCA, and *as we view the situation the most plausible contention made by plaintiffs is that the Commission abused its discretion in refusing to extend the effective date of its order so that it might further consider the situation, and particularly the improvement which it is claimed had been made by RCA and others.*" (Italics supplied)

In addition, in stating the ground upon which it granted defendants' motions for summary judgment and to dismiss the complaint, the majority of the District Court had the following to say:

> "Thus, as we evaluate the situation, there are two courses open, (1) to allow defendants' motion for a summary judgment, and (2) to vacate the order and send the proceeding back to the Commission for further consideration in view of recent developments in the color television field as well as the rapidly changing economic situation. *A pursuance of the latter course, assuming we have such authority, of which there may be doubt, would inevitably result in the prolongation of the controversy which badly needs the finality of decision which can be made only by the Supreme Court.*

In other words, the interests of all, so we think, will be better served with this controversy on its way up rather than back from whence it comes." (Italics supplied)

In spite of these two statements, the majority of the District Court also stated that it would constitute a trial *de novo* for the District Court to consider anything outside the record made before the Commission.

As has been set forth above, the RCA Progress Report and the Report of the Condon Committee were in fact part of the record before the Commission.

In addition, the consideration by the District Court of these two reports and the other matters which it is contended should have been considered by the Commission would not constitute a trial *de novo*. The District Court could not determine whether the Commission had properly discharged its statutory obligations without considering the material which appellants contend was wrongfully ignored by the Commission.

6. Many of the questions presented to the Supreme Court by the instant appeal are questions presented to, but left unresolved by, the majority of the District Court.

The court's opinion did not mention the contentions that:

1. The adoption of incompatible color standards was contrary to the statutory standard of public interest which governs Commission action.

2. The refusal to adopt compatible standards was arbitrary and contrary to the statutory standard of public interest.

3. The adoption of incompatible standards to the exclusion of compatible standards was an unreasonable suppression of competition and beyond the Commission's jurisdiction.

The court mentioned but did not resolve the contentions that:

1. The Commission's Order was not based on substantial evidence.[4]

2. The evidence alleged to support the Order was evidence taken early in the hearings which had been superseded and rendered obsolete by evidence of later technical developments achieved during the course of the hearings.

3. The Commission had abused its discretion and violated statutory command in refusing to consider relevant matter submitted, at the Commission's invitation, after the close of the hearings but before the close of the administrative record.

The reason for this is indicated by the statement in the District Court's opinion that the court felt its proceedings were "little more than a practice session" for the instant appeal. As the court elaborated this proposition, "in studying the case we have been unable to free our minds of the question as to why we should devote the time and energy which the importance of the case merits, realizing as we must that the controversy can only be finally terminated by a decision of the Supreme Court."

The District Court's view of its function would result in delegating to the Supreme Court primary responsibility for judicial review of administrative action. The Supreme Court cannot be converted into the court of first instance in cases of this character without controverting the judicial code and the Constitution.

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[4] The court stated that while the findings of the Commission were severely criticized it was not contended in the main that they are not supported by substantial evidence. This inference is inconsistent with the pleadings, briefs and oral argument of plaintiffs and plaintiff-interveners. However, the court went on to state that a number of the critical findings were based upon evidence not representative of the situation as of the time the findings were adopted. The court also observed that plaintiffs' contention that the Commission abused its discretion in refusing to consider the situation further was a plausible one.

7. The Commission's Order permitting the commercial broadcasting of television signals which cannot produce a picture on existing sets is contrary to the public interest, as defined by the Commission itself.

The Supreme Court has held that the guiding statutory standard of the public interest, convenience or necessity is not to be interpreted as setting up a standard so indefinite as to confer unlimited power. On the contrary, the Supreme Court held that the public interest to be served under is the interest of the listening public in the larger and more effective use of radio. *National Broadcasting Company* v. *United States,* 319 U.S. 190.

The foundation decision by the Commission on the specific meaning to be given to the standard of the "public interest, convenience, or necessity" with respect to television transmission standards is its Report of May 28, 1940, which was occasioned by the Commission's refusal at that time to authorize commercial television. The Commission then found that the public interest required the fixing of television transmission standards which

> (a) Permit all receivers to obtain pictures from all transmissions, thus providing a standard gauge and assuring continuity of service to the public;
>
> (b) Permit the highest quality of service known to the art while leaving ample room for all foreseeable improvements; and
>
> (c) Are adopted only after the potentialities of basic research have been fairly explored and the industry is in substantial agreement upon them.

The Order of the Commission here under review departs from all three of these elements of the public interest, convenience, or necessity.

The Order departs entirely from the principle that all receivers should be able to obtain pictures from all trans-

missions. The CBS system is an incompatible system, which means that none of the receivers in the hands of the public (9,000,000 in November, 1950) can receive any picture from CBS system transmissions. As stated by the District Court, even after existing receivers have undergone the necessary adaptation at a cost of more than $50 per receiver, or a total public expense of nearly one-half a billion dollars, all that can be received from a CBS system color transmission is a degraded black and white picture. In order to receive color, existing receivers need a converter in addition to an adapter at an expense per set of more than $100, or a total additional public expense of nearly a billion dollars.[5]

The Order deviates from the principle that commercial standards should permit the highest quality of service known to the art while leaving ample room for all foreseeable improvements. Of the three systems proposed, only the RCA system takes full advantage of the present state of the art and the RCA system leaves the fullest scope for future improvements within the framework of the standards called for by that system. The CBS system represents a retrogression even from existing black and white standards.

The Order was also entered before the potentialities of basic research had been fairly explored, and represents the first attempt of the Commission to adopt technical standards in the face of almost complete unanimity on the part of the technical experts of the industry that such standards should not be adopted.

8. That part of the Commission's Order which suppresses competition by not allowing the broadcast of compatible color television in accordance with the RCA sys-

[5] These figures are based on the number of receivers owned by the public in November, 1950.

tem is unlawful and exceeds its jurisdiction, regardless of the validity of so much of the Commission's Order as permits broadcasting of color television on the CBS system.

This question involves the power of the Commission to prohibit the transmission of television signals where, as conceded by CBS and not contradicted by anyone else, broadcasting of such signals would not hurt anyone.

Television signals broadcast in accordance with the RCA system can be received on all existing receivers as a black and white picture without the owners so much as touching their receivers.

No contention is made that the quality of the black and white picture produced by the RCA color system is a ground for denying this system to the public nor that transmission of RCA color signals would utilize more of the radio frequency spectrum or interfere with other services.

The Commission's Order, of course, allows the continued transmission of television signals which will do no more than produce black and white pictures. The fact that television signals broadcast in accordance with the RCA system will also, on an appropriate receiver, produce a color picture is no ground for prohibiting such transmissions. The Communications Act gives the Commission no power thus to suppress competition. On the contrary, a policy of that Act, insofar as it relates to broadcasting, is to encourage competition.

There are no findings or conclusions which bring the Commission's refusal to permit broadcasting of the RCA color television system within the ambit of the Commission's statutory authority. Nor would any such findings or conclusions be supported by the record before the Commission.

9. The Commission's First Report clearly recognized the advisability of obtaining more information with respect to all color television systems before a final decision as to

commercial color television standards was made. The Commission, however, stated that it would do this only if the industry accepted two conditions; namely, if the television manufacturing industry, which is outside the Commission's jurisdiction, would build all future receivers in accordance with detailed specifications laid down by the Commission, and if new black and white standards could be adopted without a hearing.

Neither of these two conditions was lawful. Nevertheless, when the Commission failed in its attempt to impose these conditions, it proceeded to adopt the CBS system without obtaining the additional information.

Inasmuch as the Order is thus predicated upon two illegal conditions, it is unlawful.

10. As stated by Judge LaBuy in his dissent:

> "It is conceded by all and it is self-evident that the best system of color television is a compatible one; that is, a system requiring no change whatever in existing receivers for the reception of black and white • • • pictures. Indeed, compatibility is the coveted goal of all engineers and scientists engaged in the television industry."

The only witnesses who testified in favor of the adoption of the CBS incompatible system were CBS engineers and Mr. Chapin, one of the Commission's staff engineers.

All the other industry engineers and impartial television experts who testified in favor of the adoption of any system, testified in favor of the adoption of an all-electronic, high-definition, compatible color television system such as the RCA system.

The Commission either ignored or sought to discredit all this testimony in favor of a compatible system and, in addition, deliberately ignored the Condon Committee's analysis of the three systems proposed. The Commission

also refused to look at evidence fully available to it which would have established the correctness of the testimony favoring a compatible system.

Although the Order purports to rest upon judgments with respect to a highly complicated electronics art, it is notable that the Commission found it necessary to try to discredit every disinterested industry expert who appeared before it, and that many of its findings are supported only by the testimony of CBS engineers or by Chapin.

As to Chapin, the record shows that he was the co-inventor of an automatic switch usable with the CBS system, but not with a compatible color system. While Chapin foreswore any financial interest in the invention, the interests of prestige and reputation through the adoption of the CBS system and the consequent use of his invention remain.

Although RCA objected, this engineer was allowed to continue in the proceedings and subsequently gave testimony favorable to the CBS system. In addition, Chapin had charge of the Commission's laboratory which tested the various color systems and he participated in the Commission's deliberations leading to the adoption of the Order.

Only two of the seven members of the Commission have had technical training and one of the two dissented from the adoption of the Order. This Commissioner was formerly Chief Engineer of the Commission. The rest are laymen.

In such a situation, namely, where laymen must make judgments of a highly complicated electronics art, they must of necessity rely to a large extent upon the opinions of their technical staff. In such a situation, it was improper for the Commission to permit Chapin to continue in the proceedings after his interest became known.

Dated: January 25, 1951.

[Signatures on pages 24 and 25]

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APPENDIX

IN THE UNITED STATES DISTRICT COURT, NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION

Civil Action No. 50-C-1459

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., and RCA VICTOR DISTRIBUTING CORPORATION, *Plaintiffs*,

vs.

UNITED STATES OF AMERICA and FEDERAL COMMUNICATIONS COMMISSION, *Defendants*.

DECEMBER 20, 1950

Before MAJOR, *Circuit Judge*, SULLIVAN and LA BUY, *District Judges*.

MAJOR, *Circuit Judge*. This action was brought to enjoin and set aside an order of the Federal Communications Commission, adopted October 10, 1950, effective November 20, 1950, which promulgated standards for the transmission of color television. Plaintiff Radio Corporation of America (RCA) is engaged, among other things, in research and development work in the field of electronics, and particularly in the field of radio and television, as well as in the manufacture and sale of radio and television transmitting and receiving apparatus and parts. Plaintiff National Broadcasting Company (NBC) is engaged in sound and television broadcasting, including network broadcasting. Plaintiff Victor Distributing Corporation is engaged in the sale of articles and products manufactured by the Victor Division of RCA. Both this distributing company and NBC are wholly owned subsidiaries of RCA. The defendants are the United States and the Federal Communications Commission.

The complaint sought an interlocutory injunction until the further order of the court and a permanent injunction upon final hearing. The defendants moved for a summary judgment and a dismissal of the complaint on the ground

that there was no genuine issue as to any material fact and that defendants were entitled to a judgment as a matter of law.

A three-judge court was convened, as required by Title 28 U.S.C.A. Secs. 2284 and 2325. On the issues thus presented, the matter came on for hearing and oral argument was heard on November 14, 15, and 16, 1950.

Prior to the time of oral argument, the Columbia Broadcasting System (CBS), also engaged in sound and television broadcasting, by agreement of the parties, was allowed to intervene in support of the Commission's order. Either during or previous to the oral argument, the following parties, over the objection of defendants, were permitted to intervene in support of plaintiffs' attack upon the Commission's order: Local No. 1031 of the International Brotherhood of Electrical Workers, representing 21,000 members, 18,000 of whom are employed in Chicago or vicinity in the manufacture of radio and television sets or in the manufacture of parts and in the assembling thereof; Pilot Radio Corporation; Emerson Radio and Phonograph Corporation; Wells-Gardner & Company, Sightmaster Corporation and Radio Craftsmen, Inc., all manufacturers of television and receiving equipment; and Television Installation Service Association, a trade organization engaged in the business of servicing and installing radios and television equipment in the Chicago area.

The statutes involved with respect to the jurisdiction of this court are Title 28 U.S.C.A. Secs. 1336, 1398, 2284, 2321-25 and Sec. 402 (a) of the Communications Act of 1934, as amended, Title 47 U.S.C.A. Sec. 402 (a). With respect to the legal authority of the Commission to adopt standards, the provisions of the Communications Act mainly involved are Secs. 4 (i), 301, 303 (b), (c), (e), (f), (g) and (r). Secs. 4 (i) and 303 (r) of the Communications Act endow the Commission with authority to make rules and regulations and issue such orders as may be necessary in the execution of its functions and to carry out the provisions of the Act. Sec. 303 (b) authorizes the Commission, as the public convenience, interest or necessity requires, to prescribe the manner of the service to be rendered by

stations, and Sec. 303 (e) gives similar authority to regulate the kind of apparatus to be used with respect to its external effects. Sec. 303 (g) provides, under the same standard of the public convenience, interest or necessity, that the Commission shall "study new uses for radio, provide for experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest."

As has been shown, there was before the court at the time of the hearing plaintiffs' prayer for an interlocutory injunction and defendants' motions for a summary judgment and for dismissal of the complaint. Numerous affidavits were presented by the plaintiffs as well as by the plaintiff-intervenors, showing that irreparable damages would result if the order was permitted to take effect. Opposing affidavits were filed by the defendants and by CBS, the defendant-intervenor. There was also presented by the Commission a record of the proceedings, upon which its order was predicated.

At the conclusion of the hearing, the court took the conflicting motions under advisement and at the same time entered a temporary restraining order "restraining and suspending until further order of this court the promulgation, operation and execution of the order of the Federal Communications Commission adopted October 10, 1950, effective November 20, 1950." As a basis for this order the court entered findings of fact, including the finding, among others, that irreparable damages would result to plaintiffs and intervenors unless the Commission's order was restrained and suspended during the consideration and determination of the issues before the court, and that such temporary suspension would be in the public interest.

The order sought to be set aside has been the subject of attack on many fronts, which may be generally classified under two contentions, (1) that the order is contrary to the public interest, and (2) that its adoption represents an aribitrary and capricious attitude on the part of the Commission. Under these two general categories there are, of course, many subsidiary issues. The defendants concede that RCA has an interest which permits the main-

tenance of the instant suit, but that there is an absence of such interest on the part of the other plaintiffs, as well as on the part of the intervening plaintiffs. For the purpose of this decision, we shall assume that all the plaintiffs, as well as the intervenors, are properly before the court.

After listening to many hours of oral argument by able counsel representing the respective parties, we formed some rather definite impressions relative to the merits of the order, as well as the proceedings before the Commission upon which it rests. And our reading and study of the numerous and voluminous briefs with which we have been favored have not altered or removed those impressions. Also, in studying the case, we have been unable to free our minds of the question as to why we should devote the time and energy which the importance of the case merits, realizing as we must that the controversy can only be finally terminated by a decision of the Supreme Court. This is so because any decision we make is appealable to that court as a matter of right and we were informed during oral argument, in no uncertain terms, that which otherwise might be expected, that is, that the aggrieved party or parties will immediately appeal. In other words, this is little more than a practice session where the parties prepare and test their ammunition for the big battle ahead. Moreover, we must give recognition to our limited scope in reviewing an order of an administrative agency. While citation of authority in this respect is hardly necessary, it may not be amiss to make reference to a few recent Supreme Court opinions.

In *American Telephone & Telegraph Co. et al.* v. *United States et al.*, 299 U. S. 232, 236, wherein the court had under review an order of the instant defendant Commission, the court stated: "This court is not at liberty to substitute its own discretion for that of administrative officers who have kept within the bounds of their administrative powers. * * * it is not enough that the prescribed system of accounts shall appear to be unwise or burdensome or inferior to another. Error or unwisdom is not equivalent to abuse."

In *Federal Security Administrator* v. *Quaker Oats Co.*, 318 U. S. 218, 227, the Court of Appeals for this Circuit set aside the order of an administrative agency. The Supreme Court reversed and with reference to review provisions of administrative action, stated: "Under such provisions we have repeatedly emphasized the scope that must be allowed to the discretion and informed judgment of an expert administrative body. [Citing cases.] These considerations are especially appropriate where the review is of regulations of general application adopted by an administrative agency under its rule-making power in carrying out the policy of a statute with whose enforcement it is charged." And further the court, referring to the judgment of the administrative agency, stated (page 228): "That judgment, if based on substantial evidence of record, and if within statutory and constitutional limitations, is controlling even though the reviewing court might on the same record have arrived at a different conclusion."

More recently, in *National Broadcasting Co., Inc. et al.* v. *United States et al.*, 319 U. S. 190, 224, the court reviewed and sustained an order of the instant Commission, and in doing so stated: "The Regulations are assailed as 'arbitrary and capricious.' If this contention means that the Regulations are unwise, that they are not likely to succeed in accomplishing what the Commission intended, we can say only that the appellants have selected the wrong forum for such a plea. * * * Our duty is at an end when we find that the action of the Commission was based upon findings supported by evidence, and was made pursuant to authority granted by Congress. It is not for us to say that the 'public interest' will be furthered or retarded by the Chain Broadcasting Regulations. The responsibility belongs to the Congress for the grant of valid legislative authority and to the Commission for its exercise."

Thus, with our scope of review so firmly delineated, we turn to a brief statement, if that is possible, of the proceedings which culminated in the order under attack. The Commission for many years had considered the question of color television. CBS had formerly proposed a system, which was denied in 1947. The instant proceedings, or

that part which related to color television, were initiated by the Commission's notice of July 11, 1949 of further proposed rule-making relative to color television. This notice proposed among other things to consider color television systems, provided that such systems met two criteria: first, that they operate in a six-megacycle channel (the frequency space allotted to black and white television broadcasting stations); and second, that the pictures be received on existing television receivers "simply by making relatively minor modifications in such existing receivers," and the notice provided, "following the closing of the record and the conclusion of oral arguments, the Commission upon consideration of all proposals, counter-proposals, and evidence in this proceeding will adopt such rules, regulations and standards as will best serve the public interest, convenience or necessity." In response to this notice, comments relating in whole or in part to color television were filed by numerous parties. CBS, RCA and CTI (Color Television, Inc.) were the only parties who appeared as proponents of their own color television systems.

The hearing, participated in by all members of the Commission, commenced September 26, 1949 and ended May 26, 1950. In all, fifty-three different witnesses were heard and 265 exhibits received. The transcript of the hearing covers 9717 pages. During the period from November 22, 1949 to February 6, 1950, extensive field tests were made of the three systems proposed. Progress reports concerning these tests were filed with the Commission by the three proponents during December 1949 and January 1950. Comparative demonstrations of the three proposed systems were made on different dates until May 17, 1950. In response to the Commission's notice, proposed findings and conclusions were filed by proponents of the three systems.

On September 1, 1950, the Commission issued its first report, in which it made detailed findings and conclusions concerning the three proposed color television systems and set forth minimum criteria which such a system would have to meet in order to be considered eligible for adoption. CTI is not a party to this proceeding and there is no occa-

sion to refer to the findings as to its proposed system. We set forth in a footnote the basic findings as to the system proposed by RCA and that proposed by CBS.[6]

Notwithstanding the findings favorable to the CBS system, the Commission declined in its first report to adopt that system. Instead of and concurrently with its first report, the Commission issued a second notice of further proposed rule-making, suggesting the adoption of bracket standards in the existing monochrome television system

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[6] As to RCA:

"(1) that the color fidelity of the RCA picture is not satisfactory and that there appears to be no reasonable prospect that the defects can be overcome;

(2) that the texture of the RCA color picture is not satisfactory and that it is difficult to see how this defect can be eliminated;

(3) that the receiving equipment utilized by the RCA system is exceedingly complex and that there is no assurance, even if the tri-color tube is successfully developed, that the RCA receivers will not continue to be unduly complex and difficult to operate;

(4) that the equipment which RCA utilizes at the transmitting station is exceedingly complex and that there is no assurance that satisfactory commercial type station equipment can be built;

(5) that the RCA system is much more susceptible to certain kinds of interference than standard black-and-white or the CBS color system;

(6) that there is not adequate assurance of RCA's ability to network color of proper quality over existing facilities; and

(7) that the RCA system has not been sufficiently field tested."

As to CBS:

"(1) that CBS produces a color picture that is 'most satisfactory from the point of view of texture, color fidelity and contrast';

(2) that the CBS receivers and station equipment 'are simple to handle' and within the economic reach of the public;

(3) that though the CBS system is susceptible to flicker to a greater degree than standard black-and-white, the problem is not serious since flicker, which results from brightness, does not appear at the brightness level which is adequate for home use;

(4) that while the CBS system has less 'geometric resolution' than black-and-white, the addition of color more than outweighs this loss, and that the black-and-white pictures produced from CBS color are acceptable; and

(5) that while as a practical matter the apparatus now used by the CBS system is limited either to projection receivers of unlimited size or direct-view pictures of 12½ inch size, this size limitation will be eliminated if and when a commercial tri-color tube is successfully developed, and that in any event the public might well prefer a 12½ inch color picture to a 16 inch black-and-white picture and should not be deprived of that choice."

and invited interested parties and all manufacturers to submit comments on the proposal. This proposal embodied a method by which brackets would be incorporated in the receivers thereafter manufactured so as to permit such receivers to receive black and white pictures from present transmissions as well as color transmission by CBS. The stated purpose of this proposal was to preserve the status quo on compatibility.[7] Maintaining the status quo on compatibility required the construction of receivers capable of receiving field sequential color transmissions in black and white. Comments upon the proposed bracket standards were received from thirty-three interested parties and television receiver manufacturers which disclosed an almost unanimous opinion on the part of manufacturers and other interested parties that such a system was not capable of being produced within the time limits fixed by the Commission.

On October 4, 1950, RCA filed a petition requesting the Commission to view the improvements made in the performance of the RCA color system between December 5, 1950 and January 5, 1951, and that the Commission view further experimental broadcasts of the three proposed color systems during the period to June 20, 1951, before reaching a final determination with respect to color standards. This request by RCA was denied, and on October 10, 1950, the Commission issued its second report, which concluded that the field sequential color system should be adopted. No testimony, oral or written, was received by the Commission in the interim between the issuance of its first and second report.

In its second report (issued October 10, 1950) the Commission, with reference to its first report, stated: "The Report stated that in the Commission's opinion, the CBS system produces a color picture that is most satisfactory from the point of view of texture, color fidelity and contrast. The Commission stated that receivers and station equipment are simple to operate and that receivers when

[7] The term "compatibility" describes a situation in which no change whatever is required in existing receivers in order to enable them to receive as black and white picture a picture transmitted in color.

produced on a mass marketing basis should be within the economic reach of the great mass of purchasing public. The Commission further found that even with present equipment the CBS system can produce color pictures of sufficient brightness without objectionable flicker to be adequate for home use and that the evidence concerning long persistence phosphors shows that there is a specific method available for still further increasing brightness with no objectionable flicker. Finally, the Commission pointed out that while the CBS system has less geometric resolution than the present monochrome system the addition of color to the picture more than outweighs the loss in geometric resolution so far as apparent definition is concerned."

Simultaneously with the second report the Commission entered the order under attack, amending the Commission's Standards of Good Engineering Practice, to provide for standards of color television transmission in accordance with the field sequential system (CBS system) effective November 20, 1950. Commissioners Sterling and Hennock dissented from the Commission's second report. On the date of the issuance of its second report, the Commission also denied the petition of RCA to postpone a final determination of the color proceedings and to have further demonstrations of the three proposed color systems.

While the findings of the Commission are severely criticized, it is not contended in the main that they are not supported by substantial evidence. It is pertinently pointed out, however, that a number of critical findings are based upon evidence which was taken in the earlier stage of the proceeding which is not representative of the situation as it existed at the time the findings were adopted. Admittedly, much progress was made during the latter portion of the hearings and, as claimed, after the hearings closed, in the development of a compatible system of color television. Particularly was such progress made by RCA, and as we view the situation the most plausible contention made by plaintiffs is that the Commission abused its discretion in refusing to extend the effective date of its order so that it might further consider

the situation, and particularly the improvement which it is claimed had been made by RCA and others.

On the merits of the case, however, with which we are directly confronted by reason of defendants' motion for a summary judgment, much of plaintiffs' argument—in fact, the major portion of it—is predicated upon matters outside the record made before the Commission, and without going into too much detail we think it relevant to refer to some of such matters. While many affidavits offered by the plaintiffs as well as the intervening plaintiffs are proper, no doubt, to show damage in support of their asserted right to an injunction, many of them go far beyond this purpose and contain a recitation of alleged facts directly in conflict with the findings made by the Commission. Typical of such affidavits is that of Dr. C. B. Jolliffe, Executive Vice President in charge of the RCA Laboratories. His affidavit, in addition to showing damages which will be sustained by RCA as a result of the order, goes extensively into the alleged merits of the RCA system, the alleged demerits of the CBS system and the alleged errors committed by the Commission in reaching its decision. And much of plaintiffs' argument is predicated upon matters brought before the court in this fashion. In our view, such asserted facts are not properly before the court. A consideration of such matters would in effect amount to a trial de novo, which we are without power to grant. Thus, much of plaintiffs' argument, predicated upon such immaterial matter, appealing as it is, must be discarded.

Another segment of evidence upon which much reliance is placed is the report made by the so-called Condon Committee. Dr. Edward U. Condon, Director of the National Bureau of Standards of the United States Department of Commerce was, under date of May 20, 1949, requested by the Chairman of the Senate Committee on Interstate and Foreign Commerce to organize a committee to give "sound, impartial, scientific advice" on color television. Dr. Condon was the head of this committee, which included a group of scientific persons of repute, none of whom were employed by or had any connection directly or indirectly

with any radio licensee or radio-equipment manufacturer. The report of this committee was released July 10, 1950, and considered at length the three color systems which had been proposed, and analyzed the present and potential performance of those systems. The report discloses that it took into consideration, among other matters, the testimony and demonstrations given before the Commission in the instant proceedings. No doubt this report refutes numerous of the findings made by the Commission and gives a far more favorable appraisement of the RCA system than that attributed to it by the Commission. Whether this report was considered by the Commission we do not know, but it is not referred to in the Commission's reports or its findings. As stated, this report was made to Congress, and we suppose a court could take judicial notice of it for some purposes, but again, in our view, it cannot be considered here for the purpose of impeaching the order of the Commission or the proceedings had before it. After all, Congress has conferred upon the Commission and charged it with the responsibility of conducting hearings and in reaching its own independent conclusions predicated thereon.

Another matter somewhat akin to those which we have just discussed was sought to be injected into this hearing by Pilot Radio Corporation, a plaintiff-intervenor. At the request of Pilot, two subpoenas duces tecum were issued out of this court on November 8, 1950, one addressed to the Commission and the other to CBS, requiring the production at the hearing in this matter of certain letters, documents, etc., described in said subpoenas. In response to the subpoenas the requested material was produced by the parties to whom the subpoenas were directed and lodged with the clerk of this court. At the same time, a motion was made to quash the subpoenas on the basis that the produced material was irrelevant and immaterial. The matter produced in the main consists of an exchange of letters between Honorable Edwin C. Johnson, Chairman of the Senate Interstate and Foreign Commerce Committee, and the Commission or members thereof, as well as correspondence exchanged between Senator Johnson and the officials

of CBS. In addition, there was offered in evidence at the time of the hearing an exchange of telegrams or letters between Senator Johnson and counsel for Pilot. We are advised by counsel that the purpose of these letters and telegrams is to show "that constant and vigorous pressure exerted by the Chairman" was responsible for the Commission's asserted precipitate action. The matter thus sought to be injected is, of course, no part of the record made before the Commission and it cannot be properly considered here. In this connection, we should point out that neither Pilot nor any other intervenor nor plaintiffs make any charge or allegation in their pleadings that the Commission in making its order was influenced, cajoled or coerced by Senator Johnson or anybody else. In fact, other than the incident under discussion, there is not even an intimation by any of the interested parties that the Commission acted other than in good faith and in discharge of what it considered to be its statutory duty. The motion to quash these subpoenas duces tecum not heretofore passed upon is allowed.

Another matter which perhaps should be mentioned arises from plaintiffs' contention that the Commission improperly relied upon the testimony and assistance of one of its staff engineers who it is asserted was an interested party because he was the inventor of an automatic switch usable with a non-compatible system such as that proposed by CBS. The witness was not the owner of and had no financial interest in the patent. He demonstrated the device on the record, to which an objection was made; however, no objection was made to his further testimony or participation in the proceeding. In fact, it appears that the matter was not again mentioned until raised in this court. It appears to us that the interest of the witness if it had any relevancy went to the weight or credit to be given his testimony, and that this was a matter for the determination of the Commission. In any event, it furnishes no basis for invalidating the Commission's order.

In the view we take of the case, there is no evidence under the pleadings which this court could properly hear. We take this view notwithstanding the suggestion made

by counsel for RCA in oral argument and reiterated in its brief, that RCA might desire to introduce witnesses at a final hearing. We gather from the suggestion made that such testimony would be offered for the purpose of showing current developments, which we suppose means developments since the entry of the order, which have been called to the attention of the Commission and which it refuses to consider. Plaintiffs disclaim that this would constitute a trial de novo. With this contention we do not agree. We reiterate that under well established principles our function is to hear and determine the questions before us solely on the record made before the Commission.

Thus, as we evaluate the situation, there are two courses open, (1) to allow defendants' motion for a summary judgment, and (2) to vacate the order and send the proceeding back to the Commission for further consideration in view of recent developments in the color television field as well as the rapidly changing economic situation. A pursuance of the latter course, assuming we have such authority, of which there may be doubt, would inevitably result in the prolongation of the controversy which badly needs the finality of decision which can be made only by the Supreme Court. In other words, the interests of all, so we think, will be better served with this controversy on its way up rather than back from whence it comes.

Even though we propose to allow defendants' motion for a summary judgment, it does not follow that the temporary restraining order heretofore entered should not remain in effect. In fact, we are definitely of the view that it should, until such time as the controversy is before the Supreme Court. While there may appear to be some inconsistency in pursuing this course, we think such procedure is within our discretion. In *National Broadcasting Co.* v. *United States*, 44 F. Supp. 688, a statutory court under circumstances quite similar to those here held it was without jurisdiction to review an order of the Commission, and dismissed the complaint. Even so, it granted a stay until the matter could be appealed to the Supreme Court. Holding that the District Court had jurisdiction the Supreme Court reversed. 316 U. S. 447. In doing so, it

suggested (page 449), "The stay now in effect will be continued, on terms to be settled by the court below." Thereupon, the case was tried by the District Court on its merits, a summary judgment allowed in favor of the defendants and the complaint again dismissed. And again the Commission's order was stayed pending appeal to the Supreme Court, and this time the judgment of the court below was affirmed. 319 U. S. 190. Insofar as we are able to discern from that opinion, the stay order allowed by the District Court remained in effect until the case was finally decided by the Supreme Court.

Thus concluding that the matter of a further stay of the Commission's order is discretionary, we shall state some of the reasons which move us to preserve the status quo. Of the nine million black and white television receivers in the hands of the public, there are none capable of receiving a picture either in color or black and white, broadcast under the proposed standards. In order to receive a black and white picture, it is necessary that a receiver be equipped with an adapter estimated to cost $50.00, plus the expense of installation. In other words, it would cost the American public nearly one-half billion dollars to equip existing sets to receive, under the proposed system, black and white pictures, and even then admittedly they would be of a grade inferior to present black and white pictures. In addition, in order to receive a picture in color, it will be necessary to add to an existing receiver a converter, estimated to cost about $100.00, plus the expense of installation. Thus, this will cost the public nearly one billion dollars. In other words, upon an expenditure by the public of one and one-half billion dollars, adapters and converters can be added to existing receivers so as to receive, under the proposed system, pictures in black and white and in color.

But this is only a part of the story insofar as it relates to the public. It was here stated in oral argument and not disputed that there are no adapters or converters on the market and that manufacturers would require a period of from six to eight months before they could be made available. So it seems reasonable to conclude that if the instant

order was now in effect, there would be no broadcasting under the proposed standards for many months, for the simple reason that there would be no sets capable of receiving such programs. And it does not square with common sense to think that manufacturers would rush into the business either of manufacturing adapters and converters for existing sets or manufacturing sets with built-in adapters and converters while this controversy is pending. And to maintain that the public in any considerable number would purchase adapters and converters, assuming they were available, under the existing state of doubt and uncertainty, is to cast a reflection on the intelligence of people.

Another matter which does not escape our attention is the insistence displayed by the defendants, including CBS, that this order at all hazards must become effective November 20, 1950, the date fixed by the Commission. This apparently was a magic date, so much so that defendants opposed a postponement until this court could have an opportunity to study and decide the issues presented. Perhaps the most substantial attack made upon the Commission's order is the adoption of standards which call for an incompatible system which, as admitted by all the parties including the defendants and CBS, is less desirable than a compatible system. Of course, the Commission's position in this respect is predicated upon its conclusion that no satisfactory compatible system was demonstrated, while the incompatible system which it approved was satisfactory. And the main argument against a stay of the order is that incompatibility is and will rapidly increase as the public continues to purchase existing receivers. As is stated in defendants' brief, "The grant by this court of an interlocutory injunction will encourage the increased sale of receivers requiring outside adaption to receive CBS color transmission in black and white. The difference between this cost and the cost of adapting receivers at the factory is the price the American public will pay if the Commission's decision is finally upheld." This argument is based on the assumption that the Supreme Court will sustain the validity of the order. It ignores a contrary possibility. Certainly this court is pos-

sessed of no such omnipotence, and we doubt if the Commission is. Even if the order was in effect, the owners of existing receivers could not within the next several months obtain the equipment which would enable them to receive the authorized broadcasts. But assume that they could and did so. Where would the public find itself in the event the order was held invalid by the Supreme Court?

In our view, the public interest in this matter has been magnified far beyond its true perspective. We are even told that this suit is a contest between television manufacturers and the public on some theory that it is to the financial gain of the former to refuse and delay the manufacture of television sets capable of receiving the broadcast authorized. Any merit in this contention, so we think, is completely overshadowed by what appears to be evident, that is, that the contest is mainly between two great broadcasting systems for a position of advantage in this rapidly developing field of television.

Another reason why this order should be stayed is the existing economic situation, recognized by Commissioner Sterling in his dissenting opinion, wherein he stated, "The problems confronting manufacturers today in terms of production, procurement and manpower to meet the demands of national defense are serious ones. * * It is well known that there are serious shortages of tubes and resisters as well as basic materials. * * Moreover, in many instances industry has been required to divert its TV engineering experts to problems of production for defense because of the close relationship of TV techniques to radar and other electronic devices the government requires." It is a matter of common knowledge that the situation thus described becomes more acute with each passing day, and the prospects are that it will be far worse before it is better. It is hardly conceivable that either the Commission or the government would under such circumstances desire, much less insist, that the order in controversy be made effective.

Our purpose is to restrain the effective date of the order until the aggrieved parties have had an opportunity to perfect an appeal to the Supreme Court. Therefore, the temporary restraining order heretofore entered will re-

main and continue in force until April 1, 1951, or until terminated by the Supreme Court. And we re-adopt the findings heretofore made in support of the continuation of such order.

A summary judgment will be entered in favor of the defendants and against the plaintiffs, and the complaint dismissed. No testimony having been heard or considered other than the record made before the Commission, no findings are required in support of such judgment.

LA BUY, D. J., dissenting:

It is conceded by all and it is self-evident that the best system of color television is a compatible one; that is, a system requiring no change whatever in existing receivers for the reception of black and white as well as color pictures. Indeed, compatibility is the coveted goal of all engineers and scientists engaged in the television industry.

In its order of October 11, 1950 (F3), the Commission stated:

> ". . . that the state of the television art is such that new ideas and new inventions are matters of weekly, even daily occurrence; . . ."

And again, in recognizing the rapid developments in the field, the Commission said (B92, First Report):

> "The third matter we refer to is the possibility of new color systems and improvements in existing color systems which have been informally called to our attention since the hearings closed. Of course, these are not matters of record and cannot be relied on in reaching a decision unless the record is reopened. In considering these developments the Commission is aware that the institution of these proceedings stimulated great activity in the color field and that since fundamental research cannot be performed on schedule, it is possible that much of the fruit of this research is only now beginning to emerge.***"

Commissioner Sterling, dissenting with what he characterized the "premature action taken by the majority",

also stated among other reasons for his disapproval of the action of the Commission "new developments came fast in the closing days of the hearing and immediately thereafter". Commissioner Hennock, who also disagreed with the Commission's speedy action, expressed her views as follows,

> ". . . in the light of the progress made in the development of color television since the start of the instant proceeding, I think it is essential to defer final decision in this matter until June 30, 1951.
>
> "*** It is of vital importance to the future of television that we make every effort to gain the time necessary for further experimentation leading to the perfection of a compatible color television system. ***"

In its First Report, the Commission stated:

> " * * * two difficult courses of action are open to the Commission. The first course of action is to reopen the record . . . The second course of action is to adopt a final decision.
>
> "The advantage of the first course of action is that the Commission would not be compelled to speculate as to an important basis for its decision . . . The disadvantage is that it would postpone a final decision and hence would aggravate the compatability problem. *** The advantage of the second course of action is that it would bring a speedy conclusion to the matters in issue and would furnish manufacturers with a real incentive to build a successful tricolor tube as soon as possible. *** The disadvantage is that the Commission's determination on an important part of its decision would be based on speculation and hope rather than on demonstrations."

On October 4, 1950 RCA petitioned the Commission to review the progress made in developing and perfecting the various systems before a final determination. It offered to show the Commission improvements in certain phases of their system about which the Commission expressed doubts. The Commission denied the petition giving among other

reasons that "delay in reaching a determination . . . would not be conducive to the orderly and expeditious dispatch of the Commission's business".

The Commission recognized and the record before the Commission is replete with evidence that rapid strides are being made toward the perfection of a fully compatible system. There is ample basis for the conclusion that the scientists laboring in the laboratories of the industry may soon resolve the problem of compatibility. In view of the admittedly fluid state of the art, it is difficult to understand why the Commission refused to hear additional evidence and chose instead a course of action, using its own words, based "on speculation and hope rather than on demonstrations."

It is estimated that the cost of conversion to the new standards set by the Commission will cost the public in excess of a billion dollars. If hope and speculation may lawfully be substituted for evidence as a foundation for an important part of its decision, it was an abuse of discretion not to have indulged this speculation and hope in the public interest. The Commission chose a speedy determination of an issue of great public interest in preference to the more patient consideration which the magnitude of the question warranted. To prohibit the broadcast of color in completely compatible systems, whether it is RCA or any other fully compatible system, is a bar to competition between compatible and incompatible color and is unreasonable and arbitrary.

It is my opinion the Commission's precipitous action in entering the order, the impact of which will require owners of television sets to install equipment at a cost of many hundreds of millions of dollars, and its refusal to hear additional evidence clearly indicates an abuse of discretion and constituted action which was arbitrary and capricious.

I would overrule the motion to dismiss and for a summary judgment and would restrain the enforcement of the order.

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION

No. 50 C 1459

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., AND RCA VICTOR DISTRIBUTING CORPORATION, *Plaintiffs*,

vs.

UNITED STATES OF AMERICA AND FEDERAL COMMUNICATIONS COMMISSION, *Defendants*

ORDER

This cause having come on to be heard on plaintiffs' motion for interlocutory injunction and for a temporary restraining order, and on defendants' motion for summary judgment and to dismiss the Complaint, and the Court having heard the arguments of counsel and having considered the briefs filed herein, and the Court being fully advised in the premises,

It is hereby ordered that the temporary restraining Order entered November 16, 1950 restraining and suspending the promulgation, operation and execution of the Order of the Commission of October 10, 1950, be and it hereby is continued in full force and effect until April 1, 1951, or until terminated by the Supreme Court of the United States, and the findings of fact and conclusions of law heretofore made in support of said temporary restraining order are hereby re-adopted.

It is further ordered that a summary judgment be and it hereby is entered in favor of the defendants and against the plaintiffs and the complaint is dismissed.

J. EARL MAJOR,
Judge, United States Court of Appeals, Seventh Circuit.

PHILIP L. SULLIVAN,
Judge, United States District Court.

Dissenting:

WALTER J. LABUY,
Judge, United States District Court.

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION

No. 50 C 1459

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., AND RCA VICTOR DISTRIBUTING CORPORATION, *Plaintiffs*,

vs.

UNITED STATES OF AMERICA AND FEDERAL COMMUNICATIONS COMMISSION, *Defendants*

MEMORANDUM ORDER ENTERED JANUARY 23, 1951, BY JUDGE MAJOR AND JUDGE SULLIVAN.

Ordered, with the consent of the parties to this cause, that the last paragraph of the order entered herein on December 22, 1950, be and it is hereby amended for the purpose of clarification, nunc pro tunc as of that date, to read as follows: "It is further ordered that a summary judgment be and it hereby is entered in favor of the defendants and against the plaintiffs, including the plaintiff-intervenors, and that the complaints, including those of the plaintiff-intervenors, are dismissed."

IN THE DISTRICT COURT OF THE UNITED STATES FOR THE NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION

Civil Action No. 50 C 1459

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., AND RCA VICTOR DISTRIBUTING CORPORATION, *Plaintiffs*,

against

UNITED STATES OF AMERICA AND FEDERAL COMMUNICATIONS COMMISSION, *Defendants*

FINDING OF FACT AND CONCLUSIONS OF LAW

This cause coming on to be heard on the 14th and 15th days of November, 1950, upon a motion of plaintiffs for an interlocutory injunction, and for a temporary restraining order from and after November 20, 1950, in the event the motion for an interlocutory injunction is not determined by that date, which motion has been adopted and joined in by interveners Emerson Radio & Phonograph Corporation, Pilot Radio Corporation, Wells-Gardner & Co., Sightmaster Corporation, The Radio Craftsmen Incorporated, Television Installation Service Association, and Local 1031, International Brotherhood of Electrical Workers, AFL, and upon motions by defendants and the intervener, Columbia Broadcasting System, Inc. to dismiss the Complaint, or in the alternative for summary judgment, before the Honorable J. Earl Major, Chief Judge of the United States Court of Appeals, Seventh Circuit, and the Honorable Philip L. Sullivan and Walter J. LaBuy, Judges of the District Court of the United States for the Northern District of Illinois, Eastern Division, and upon all pleadings, affidavits and documents filed by the parties and upon consideration thereof and of the arguments of counsel for the respective parties, the Court, being advised in the premises, hereby makes the following Findings of Fact and Conclusions of Law:

Findings of Fact

1. The Federal Communications Commission (hereinafter called the Commission) on October 10, 195. adopted an Order amending the Commission's "Standards of Good Engineering Practice Concerning Television Broadcast Stations". The order adopted the color television system of the intervener, Columbia Broadcasting System, Inc., and precludes the transmission of the color television system proposed by plaintiff Radio Corporation of America and of all other proposed systems other than the one adopted.

2. The Order, to become effective on November 20, 1950, provides for the commercial broadcasting of color television on standards which are different from the existing standards for the commercial broadcasting of black and white television, which have been in effect since 1941.

3. There are now in the hands of the public approximately 9,000,000 black and white television receivers, none of which can receive any programs broadcast in accordance with the new standards promulgated by the Order.

4. To protect the service which they have been getting, the owners of these 9,000,000 black and white television receivers would have to spend millions of dollars in order to adapt their sets to receive programs broadcast on the new standards.

5. After such adaptation, programs broadcast under the new standards would be received only as a black and white picture having less than one-half the picture detail of the existing black and white service.

6. For the public to both adapt and convert the existing 9,000,000 television receivers so that they would receive in color the programs broadcast in accordance with the new standards would cost many more millions of dollars.

7. Plaintiffs, on October 17, 1950, brought this action to enjoin, set aside, annul and suspend the Commission's Order of October 10, 1950.

8. Plaintiffs have moved for an interlocutory injunction to restrain and suspend the promulgation, operation and execution of the Order, and for a temporary restraining order from and after November 20, 1950, in the event the

motion for an interlocutory injunction is not determined by that date.

9. The pending action in which this motion is made has been brought pursuant to the provisions of Section 402(a) of the Communications Act of 1934, as amended (47 U.S.C. Sec. 402(a)) and of Title 28, United States Code (28 U.S.C. Secs. 1336, 1398, 2284, 2321-25), and of Section 10 of the Administrative Procedure Act (60 Stat. 243; 5 U.S.C. Sec. 1009), providing for the judicial review of orders of the Commission of the kind here involved, and for the issuance of temporary relief against injury caused thereby.

10. Plaintiffs' motion for an interlocutory injunction and for a temporary restraining order has been adopted and joined in by all parties who have intervened seeking to vacate, set aside, suspend and annul the Commission's Order of October 10, 1950.

11. The Court, while having been advised in the premises, has not had sufficient time to consider fully the issues raised by the verified complaints and the affidavits filed by the parties prior to November 20, 1950, the effective date of the Commission's Order.

12. The plaintiffs and interveners, representing manufacturers, employees, a distributor, a television broadcaster, a proponent of a color television system, set owners and television servicemen will suffer irreparable damage if the Commission's Order is not restrained or suspended during the consideration and determination of the motion for an interlocutory injunction, by virtue of the impairment of the market acceptance of present television receivers and by virtue of the inability of present television receivers to receive any broadcast on the standards adopted by the Order without substantial expenditures which may prove to be useless. The foregoing is shown by: the affidavits of C. B. Jolliffe, sworn to on November 8, 1950; Walter A. Buck, sworn to on November 8, 1950; John H. McDonald, sworn to on November 8, 1950; Walter M. Norton, sworn to on November 9, 1950; Richard L. Hirsch, sworn to on November 13, 1950; Harold V. Levin, sworn to on November 13, 1950; and J. O. Reinecke, sworn to on November 13, 1950; the verified Complaints of Emerson Radio

& Phonograph Corporation, Wells-Gardner & Co., The Radio Craftsmen Incorporated, Television Installation Service Association, and Local 1031, International Brotherhood of Electrical Workers, AFL; and all other affidavits submitted in this action.

13. The temporary suspension of the aforesaid Order of the Federal Communications Commission pending a determination of the aforesaid motion for an interlocutory injunction will be in the public interest.

Conclusion of Law

Plaintiffs' motion for a temporary restraining order restraining and suspending until further order of this Court the promulgation, operation and execution of the Order of the Federal Communications Commission adopted October 10, 1950, effective November 20, 1950, should be granted.

Enter:

J. Earl Major,
Judge of the United States Court of Appeals, Seventh Circuit;
Philip L. Sullivan,
Judge of the United States District Court;
Walter J. La Buy,
Judge of the United States District Court.

Dated: Nov. 16, 1950.

IN THE DISTRICT COURT OF THE UNITED STATES FOR THE NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION

Civil Action No. 50 C 1459

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC.

and

RCA VICTOR DISTRIBUTING CORPORATION, *Plaintiffs*

against

UNITED STATES OF AMERICA and FEDERAL COMMUNICATIONS COMMISSION, *Defendants*

TEMPORARY RESTRAINING ORDER

Plaintiffs' motion for an interlocutory injunction and for a temporary restraining order from and after November 20, 1950 in the event the motion for an interlocutory injunction is not determined by that date, which motion has been adopted and joined in by interveners Emerson Radio & Phonograph Corporation, Pilot Radio Corporation, Wells-Gardner & Co., Sightmaster Corporation, The Radio Craftsmen Incorporated, Television Installation Service Association, and Local 1031, International Brotherhood of Electrical Workers, AFL, and defendants' and intervener's (Columbia Broadcasting System, Inc.) motions to dismiss the Complaint, or in the alternative for summary judgment, having come on for hearing before the Court, and the Court not having had sufficient time to consider fully the issues raised and the verified complaints and affidavits filed by the parties, and having determined that irreparable damage will result if the promulgation, operation and execution of the Order of the Federal Communications Commission adopted October 10, 1950, is not restrained and suspended pending determination of the motion for an interlocutory injunction and the aforesaid motions to dismiss the Complaint, or in the alternative for summary judgment,

and the Court having made its Findings of Fact and Conclusions of Law to such effect, it is hereby

Ordered that the motion for a temporary restraining order, restraining and suspending until further order of this Court the promulgation, operation and execution of the Order of the Federal Communications Commission adopted October 10, 1950, effective November 20, 1950, be and it hereby is granted; and it is further

Ordered that the promulgation, operation and execution of the aforesaid Order of October 10, 1950 be and the same hereby is restrained and suspended pending the further order of this Court.

Enter:

J. EARL MAJOR,
Judge of the United States Court of Appeals, Seventh Circuit;

PHILIP L. SULLIVAN,
Judge of the United States District Court;

WALTER J. LABUY,
Judge of the United States District Court.

Dated: November 16, 1950.

APPENDIX B

Text of Statutes Involved

Communications Act of 1934, as amended (47 U.S.C. § 151 et seq.)

§ 303. Except as otherwise provided in this chapter, the Commission from time to time, as public convenience, interest, or necessity requires, shall—

* * *

(c) Assign bands of frequencies to the various classes of stations, and assigns frequencies for each individual station and determine the power which each station shall use and the time during which it may operate;

* * *

(e) Regulate the kind of apparatus to be used with respect to its external effects and the purity and sharpness of the emissions from each station and from the apparatus therein;

(f) Make such regulations not inconsistent with law as it may deem necessary to prevent interference between stations and to carry out the provisions of this chapter: *Provided, however,* That changes in the frequencies, authorized power, or in the times of operation of any station, shall not be made without the consent of the station licensee unless, after a public hearing, the Commission shall determine that such changes will promote public convenience or interest or will serve public necessity, or the provisions of this chapter will be more fully complied with;

(g) Study new uses for radio, provide for experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest. (48 Stat. 1082).

* * *

§ 402. (a) The provisions of Title 28, relating to the enforcing or setting aside of the orders of the Interstate Commerce Commission, are made applicable to suits to enforce, enjoin, set aside, annul, or suspend any

order of the Commission under this chapter (except any order of the Commission granting or refusing an application for a construction permit for a radio station, or for a radio station license, or for renewal of an existing radio station license, or for modification of an existing radio station license, or suspending a radio operator's license), and such suits are authorized to be brought as provided in such Title 28. (48 Stat. 1093, as amended, 50 Stat. 197, 63 Stat. 108).

Judicial Code (28 U.S.C.)

§ 1253. Direct appeals from decisions of three-judge courts

Except as otherwise provided by law, any party may appeal to the Supreme Court from an order granting or denying, after notice and hearing, an interlocutory or permanent injunction in any civil action, suit or proceeding required by any Act of Congress to be heard and determined by a district court of three judges. (62 Stat. 928)

• • •

§ 1336. Interstate Commerce Commission's orders

Except as otherwise provided by Act of Congress, the district courts shall have jurisdiction of any civil action to enforce, enjoin, set aside, annul or suspend, in whole or in part, any order of the Interstate Commerce Commission. (62 Stat. 931)

• • •

§ 2323. Duties of Attorney General; interveners

The Attorney General shall represent the Government in the actions specified in section 2321 of this title and in actions under sections 20, 23, and 43 of Title 49, in the district courts, and in the Supreme Court of the United States upon appeal from the district courts.

The Interstate Commerce Commission and any party or parties in interest to the proceeding before the Commission, in which an order or requirement is made,

may appear as parties of their own motion and as of right, and be represented by their counsel, in any action involving the validity of such order or requirement or any part thereof and the interest of such party.

Communities, associations, corporations, firms, and individuals interested in the controversy or question before the Commission, or in any action commenced under the aforesaid sections may intervene in said action at any time after commencement thereof.

The Attorney General shall not dispose of or discontinue said action or proceeding over the objection of such party or intervenor, who may prosecute, defend, or continue said action or proceeding unaffected by the action or nonaction of the Attorney General therein. (62 Stat. 970, as amended 63 Stat. 105.)

Administrative Procedure Act (5 U.S.C. § 1001 et seq.)

§ 4. Except to the extent that there is involved (1) any military, naval, or foreign affairs function of the United States or (2) any matter relating to agency management or personnel or to public property, loans, grants, benefits, or contracts—

(a) *Notice.*—General notice of proposed rule making shall be published in the Federal Register (unless all persons subject thereto are named and either personally served or otherwise have actual notice thereof in accordance with law) and shall include (1) a statement of the time, place, and nature of public rule making proceedings; (2) reference to the authority under which the rule is proposed; and (3) either the terms or substance of the proposed rule or a description of the subjects and issues involved. Except where notice or hearing is required by statute, this subsection shall not apply to interpretative rules, general statements of policy, rules of agency organization, procedure, or practice, or in any situation in which the agency for good cause finds (and incorporates the finding and a brief statement of the reasons therefor in the rules issued) that notice and public procedure thereon are

impracticable, unnecessary, or contrary to the public interest.

(b) *Procedures.*—After notice required by this section, the agency shall afford interested persons an opportunity to participate in the rule making through submission of written data, views, or arguments with or without opportunity to present the same orally in any manner; and, after consideration of all relevant matter presented, the agency shall incorporate in any rules adopted a concise general statement of their basis and purpose. Where rules are required by statute to be made on the record after opportunity for an agency hearing, the requirements of sections 1006 and 1007 of this title shall apply in place of the provisions of this subsection.

(c) *Effective dates.*—The required publication or service of any substantive rule (other than one granting or recognizing exemption or relieving restriction or interpretative rules and statements of policy) shall be made not less than thirty days prior to the effective date thereof except as otherwise provided by the agency upon good cause found and published with the rule.

(d) *Petitions.*—Every agency shall accord any interested person the right to petition for the issuance, amendment, or repeal of a rule. (60 Stat. 238, 5 U.S.C. § 1003).

§ 10. Except so far as (1) statutes preclude judicial review or (2) agency action is by law committed to agency discretion.

(a) *Right of Review.*—Any person suffering legal wrong because of any agency action, or adversely affected or aggrieved by such action within the meaning of any relevant statute, shall be entitled to judicial review thereof.

(b) *Form and Venue of Action.*—The form of proceeding for judicial review shall be any special statutory review proceeding relevant to the subject matter in any court specified by statute or, in the absence or inadequacy thereof, any applicable form of legal ac-

tion (including actions for declaratory judgments or writs of prohibitory or mandatory injunction or habeas corpus) in any court of competent jurisdiction. Agency action shall be subject to judicial review in civil or criminal proceedings for judicial enforcement except to the extent that prior, adequate, and exclusive opportunity for such review is provided by law.

(c) *Reviewable acts.*—Every agency action made reviewable by statute and every final agency action for which there is no other adequate remedy in any court shall be subject to judicial review. Any preliminary, procedural, or intermediate agency action or ruling not directly reviewable shall be subject to review upon the review of the final agency action. Except as otherwise expressly required by statute, agency action otherwise final shall be final for the purposes of this subsection whether or not there has been presented or determined any application for a declaratory order, for any form of reconsideration, or (unless the agency otherwise requires by rule and provides that the action meanwhile shall be inoperative) for an appeal to superior agency authority.

(d) *Interim relief.*—Pending judicial review any agency is authorized, where it finds that justice so requires, to postpone the effective date of any action taken by it. Upon such conditions as may be required and to the extent necessary to prevent irreparable injury, every reviewing court (including every court to which a case may be taken on appeal from or upon application for certiorari or other writ to a reviewing court) is authorized to issue all necessary and appropriate process to postpone the effective date of any agency action or to preserve status or rights pending conclusion of the review proceedings.

(e) *Scope of Review.*—So far as necessary to decision and where presented the reviewing court shall decide all relevant questions of law, interpret constitutional and statutory provisions, and determine the meaning or applicability of the terms of any agency action. It shall (A) compel agency action unlawfully

withheld or unreasonably delayed; and (B) hold unlawful and set aside agency action, findings, and conclusions found to be (1) arbitrary, capricious, and abuse of discretion, or otherwise not in accordance with law; (2) contrary to constitutional right, power, privilege, or immunity; (3) in excess of statutory jurisdiction, authority, or limitations, or short of statutory right; (4) without observance of procedure required by law; (5) unsupported by substantial evidence in any case subject to the requirements of sections 1006 and 1007 of this title or otherwise reviewed on the record of an agency hearing provided by statute; or (6) unwarranted by the facts to the extent that the facts are subject to trial de novo by the reviewing court. In making the foregoing determinations the court shall review the whole record or such portions thereof as may be cited by any party, and due account shall be taken of the rule of prejudicial error. (60 Stat. 243, 5 U.S.C. § 1009).

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SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1950

No. 565

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., RCA VICTOR DISTRIBUTING CORPORATION, ET AL.,

Appellants,

vs.

THE UNITED STATES OF AMERICA, FEDERAL COMMUNICATIONS COMMISSION AND COLUMBIA BROADCASTING SYSTEM, INC.

APPEAL FROM THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF ILLINOIS

MOTION TO AFFIRM

PHILIP B. PERLMAN,
Solicitor General;
BENEDICT P. COTTONE,
General Counsel,
Federal Communications Commission,
SAMUEL I. ROSENMAN,
RICHARD S. SALANT,
Counsel for Columbia
Broadcasting System, Inc.

INDEX

Subject Index

	Page
Motion to affirm	1
Statement	1
Argument	12
Substantial evidence	13
The reasonableness of the Commission's decision	16
The RCA "Progress Report" and the Condon Committee Report	20
The Condon Report	22
The R. C. A. Progress Report	22
Refusal to postpone final decision	23
The participation of Edward Chapin in the proceeding before the Commission	26
Prayer for affirmance	27

Table of Cases Cited

Alabama Power Co. v. *Ickes*, 302 U. S. 464	2
Alex. Sprunt & Son v. *U. S.*, 281 U. S. 249	2
American Telephone & Telegraph Co. v. *United States*, 299 U. S. 232	13, 25, 26
Associated Industries v. *Ickes*, 134 F. 2d 694	2
Ex-Cell-o v. *City of Chicago*, 115 F. 2d 627	2
Federal Security Administrator v. *Quaker Oats*, 318 U. S. 218	13
Interstate Commerce Commission v. *City of Jersey City*, 322 U. S. 503	24
Massachusetts v. *Mellon*, 262 U. S. 447	2
Moffat Tunnel League v. *U. S.*, 209 U. S. 113	2
National Broadcasting Company v. *United States*, 319 U. S. 190	13
National Labor Relations Board v. *Pittsburgh S.S. Co.*, 337 U. S. 656	15
Tennessee Electric Power Co. v. *TVA*, 306 U. S. 118	2
United States v. *Pierce Auto Freight Lines*, 327 U. S. 515	24
United States v. *Yellow Cab Co.*, 338 U. S. 338	15

STATUTES CITED

Pa

Administrative Procedure Act, Section 4 .....
Communications Act of 1934, Section 402(a), as amended (47 U.S.C. 402a) 1,
Public Law No. 901, 81st Congress, 2nd Session, approved December 29, 1950 .....

United States Code, Title 28:

Section 1398 .....
Section 2284 .....
Section 2321-2325 .....

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

Civil Action No. 50C1459

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., AND RCA VICTOR DISTRIBUTING CORPORATION, ET AL.,

vs.

UNITED STATES OF AMERICA AND FEDERAL COMMUNICATIONS COMMISSION, ET AL.

MOTION TO AFFIRM

Appellees, United States of America and Federal Communications Commission, and intervenor-appellee, Columbia Broadcasting System, Inc., pursuant to Paragraph 3 of Rule 12 of the Revised Rules of the Supreme Court of the United States, move that the judgment of the District Court be affirmed, and that the temporary restraining order now in effect be dissolved.

Statement

This is a direct appeal from the final judgment, entered on December 22, 1950, of a specially constituted three-judge District Court convened pursuant to the provisions of Section 402(a) of the Communications Act of 1934, as amended,

47 U. S. C. Section 402(a).[1] The court below (LaBuy, J. dissenting) granted the motion of defendant-appellees and intervenor-appellee for summary judgment dismissing appellants' complaints [2] which sought to set aside an order of the Federal Communications Commission. The District Court, on its own motion, also continued in force until April 1, 1951, or until terminated by this Court, a temporary restraining order which the District Court had granted pre-

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[1] Section 402(a) incorporates the provisions of Title 28, United States Code (Title 28 U.S.C. Sections 1398, 2284 and 2321-2325), relating to the enforcing and setting aside of orders of the Interstate Commerce Commission. Public Law No. 901, 81st Congress, 2nd Session, approved December 29, 1950, and effective thirty days thereafter, changing the procedure for review of orders of the Federal Communications Commission reviewable under section 402(a) of the Communications Act, is by its terms not applicable to pending actions such as the instant case.

[2] The original complainants were RCA, which had proposed its own system, and two of RCA's wholly-owned subsidiaries, National Broadcasting Company, Inc. (engaged in broadcasting) and RCA Victor Distributing Corporation (engaged in distributing *inter alia*, RCA black-and-white television sets). CBS intervened as a party defendant, and the following parties were permitted to intervene as parties plaintiff: Local 1031 of the International Brotherhood of Electrical Workers (a labor organization whose members are employed by television set manufacturers); Pilot Radio Corporation (a television set manufacturer); Emerson Radio and Phonograph Corporation (a television set manufacturer); Sightmaster Corporation (a television set manufacturer); Radio Craftsmen, Inc. (a television set manufacturer); Wells-Gardner Company (a television set manufacturer); and Television Installation Service Association (a trade association of companies engaged in installation and servicing of television sets). None of the plaintiffs or plaintiff-intervenors, except RCA, had participated in the proceedings before the Commission.

Appellees, in the Court below, objected to the intervention of the plaintiff-intervenors, and moved to dismiss the complaint as to NBC and RCA Victor Distributing, on the ground that they had no such legal interest as entitled them to maintain this suit. It is submitted that this contention is correct, and thus in any event, the appeals of all parties other than RCA should be dismissed. *Cf. Tennessee Electric Power* v. *TVA*, 306 U. S. 118; *Alabama Power Co.* v. *Ickes*, 302 U. S. 464; *Moffat Tunnel League* v. *U. S.*, 209 U. S. 113; *Alex. Sprunt & Son* v. *U. S.*, 281 U. S. 249; *Massachusetts* v. *Mellon*, 262 U. S. 447; *Associated Industries* v. *Ickes*, 134 F. 2d 694 (C.A. 2); *Ex-Cell-O* v. *City of Chicago*, 115 F. 2d 627 (C.A. 7). But since it is believed that the appeal is insubstantial on its merits, the question of standing need not be argued at this time.

viously. Appeal was allowed on January 25, 1951 and appeal papers served on January 30, 1951.

The Commission's order (15 F. R. 7013) dated October 10, 1950, and effective November 20, 1950, amended the Commission's Standards of Good Engineering Practice by establishing engineering standards for color television transmissions. The effect of the Commission's order was to permit regular non-experimental broadcasting of color television, since until standards are set for a particular broadcasting service—whether radio, black-and-white television, or color television—there can be no regular broadcasting of that service. This is because unless standards are thus first set by the Commission, each broadcaster would be free to transmit whatever type of signal he chose, regardless of its interfering effect on other broadcasters and regardless of the ability of receivers to receive the signal. Accordingly, the Commission has for each service first established transmission standards to avoid such interference and to assure that members of the public will receive a uniform satisfactory service.

The Commission's order adopting color television standards did not require any broadcaster to broadcast color television; its only effect was to provide that if the broadcaster chooses to broadcast color television, the signals transmitted must conform to the technical engineering standards adopted by the Commission.

The Commission proceedings culminating in the order adopting standards for color television broadcasting may be summarized as follows:

On July 11, 1949, the Commission issued, as part of a larger proceeding the other phases of which are not immediately relevant herein, a Notice of Further Proposed Rule Making (14 F. R. 4483). This notice invited proposals for a change in transmission standards looking toward the

inception of color television service and described the conditions upon which proposals would be considered.

Hearings were held before the Commission *en banc* commencing September 26, 1949, and ending May 26, 1950. Of ten parties participating in the hearing the Radio Corporation of America (hereinafter referred to as RCA), Columbia Broadcasting System, Inc. (hereinafter referred to as CBS), and Color Television, Inc. (hereinafter referred to as CTI) proposed their own color television systems. They proposed, respectively, a "dot sequential" system, a "field sequential" system, and a "line sequential" system. In all, 53 witnesses were heard, and 265 exhibits offered, and eight demonstrations of the proposed color systems were held on the record.

On September 1, 1950, the Commission issued its First Report (Exhibit B to Complaint) covering the color television issues.[3] In this Report the Commission made unanimous and detailed findings and conclusions concerning the characteristics and performance of the three color television systems which had been proposed to the Commission. The Commission found that color television was a fundamental improvement in television. It also found that the CTI line sequential system[4] and the RCA dot sequential system fell short of the minimum criteria enunciated by the Commission in its Report for a color system, while the CBS field sequential system met these criteria.

In its summary of its findings concerning the deficiencies of the RCA system the Commission stated (Second Report, Par. 3):

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[3] Copies of the Commission's Reports and Orders will be lodged with the Clerk of the Supreme Court.

[4] CTI has not attacked the Commission's order and is not a party to these proceedings. Further reference to the CTI system, accordingly, is omitted.

"a. The color fidelity of the RCA picture is not satisfactory.

b. The texture of the color picture is not satisfactory.

c. The receiving equipment utilized by the RCA system is exceedingly complex.

d. The equipment utilized at the station is exceedingly complex.

e. The RCA color system is much more susceptible to certain kinds of interference than the present monochrome system or the CBS system.

f. There is not adequate assurance in the record that RCA color pictures can be transmitted over the 2.7 megacycle coaxial cable facilities.

g. The RCA system has not met the requirements of successful field testing."

The Commission also found that the deficiencies in respect of RCA's color fidelity (First Report, par. 132), picture texture (*ibid*, par. 133), complexity of receiving and station equipment (*ibid*, pars. 134 and 135), and susceptibility to interference (*ibid*, par. 101, 136), appeared to be inherent in the RCA system itself, with little or no likelihood of correction within the confines of the system.

In its summary of its findings concerning the CBS system, the Commission stated (Second Report, par. 5):

". . . the CBS system produces a color picture that is most satisfactory from the point of view of texture, color fidelity and contrast . . . receivers and station equipment are simple to operate and . . . when produced on a mass marketing basis should be within the economic reach of the great mass of purchasing public. . . . even with present equipment the CBS system can produce color pictures of sufficient brightness without objectionable flicker to be adequate for home use and . . . the evidence concerning long persistence phosphors shows that there is a spe-

> cific method available for still further increasing brightness with no objectionable flicker. . . . . while the CBS system has less geometric resolution[5] than the present monochrome system the addition of color to the picture more than outweighs the loss in geometric resolution so far as apparent definition is concerned."

The Commission did not, at the time of the First Report, finally adopt the CBS system. For while the CBS system had already reached a state of development which enabled the Commission to find expressly that it was a satisfactory system suitable for adoption (First Report, Par. 149), the Commission pointed out that the record disclosed further possibilities for the development of the CBS system or apparatus, which the Commission desired to take time to explore if the public interest were not adversely affected by the postponement of a final decision. These matters were the possibility of the use of a direct view tri-color tube with the CBS system, the use of horizontal interlace, and the possible efficacy of long persistence phosphors in reducing flicker.

Because the CBS direct-view receivers which had been demonstrated utilized a disc, the picture-size was, as a practical matter, limited to 12½ inches (First Report, par. 111). While a "tri-color tube" had been developed by RCA and demonstrated by RCA with its system, and while it was agreed that this tube could be used in CBS receivers so as to free them from any picture-size limitation, the Commission had some doubts whether the tube had yet been successfully developed and hence there still was uncertainty whether the limitation on direct-view picture size

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[5] Geometric resolution is defined as "the number of lines which the system can provide"; it is one of the factors which enter into the "apparent definition", or ability to produce clarity and detail, of a picture (First Report, par. 88).

of CBS receivers remained. (First Report, pars. 111, 144-5.)

During the hearing, a development known as "horizontal interlace"—a method of transmission which provides increased detail in both standard black-and-white and CBS color pictures—had been demonstrated, but the technique had not yet been fully tested or proven. Had the technique been successfully tested and proven it would have involved additions to, or changes in, both existing black-and-white television standards and the proposed CBS color standards. (First Report, par. 147.)

Another development which had been demonstrated during the hearing but had not yet been fully proven was the use of "long-persistence phosphors"—a coating on the receiver tube which would permit increased brightness of the picture without flicker, or, alternatively, would permit a change in standards in respect of the "field rate", as well as higher definition, in both black-and-white and color pictures. (First Report, par. 147.)

In addition to these matters, the Commission also considered what course of action to take with respect to the possibility of new color systems and improvements in existing color systems which had been informally called to the Commission's attention. (First Report, par. 148.)

The Commission noted in its First Report, however, that despite the advantages of postponing adoption of standards for the CBS color system in order to await the outcome of further developments in respect of the foregoing four matters, there was an important counterbalancing disadvantage. The disadvantage arose from the fact that while, on the one hand, the RCA system is "compatible"—that is, its color signals could be received on existing black-and-white sets as black-and-white pictures without requiring any change in such sets,—the CBS system, on the other

hand, is "incompatible"—that is, its color signals produce no black-and-white picture on existing receivers unless such receivers are modified or "adapted" at a cost of $32–$50. (First Report, par. 105.)

Because of the feature of incompatibility of the only system which the Commission found to be satisfactory, delay in adopting standards for the system would, the Commission noted, aggravate the problem of incompatibility by increasing the number of black-and-white receivers in the hands of the public and hence currently incapable of receiving the color signals (First Report, pars. 146-148). As the Commission found (*ibid*, par. 148) the problem of postponement was grave since

> "eventually the mere passage of time overpowers the incompatible system by the sheer weight of receivers in the hands of the public."

Postponement of adoption of the CBS system, which had been found to be satisfactory therefore, would mean that if, after such postponement, the compatible color television systems should still prove unsatisfactory,—and they had been found to have inherent defects which made satisfactory development doubtful—adoption of the only known satisfactory system might be impracticable because of the greatly increased number of receivers in the hands of the public which would require adaptation. Delay thus might result in a serious obstacle to making color television available to the public at all.

Faced with these two "difficult courses of action" (First Report, par. 145), the Commission decided to delay final adoption of the satisfactory CBS system if a way could be found to prevent the aggravation of the problems arising out of incompatibility. The Commission suggested as a method for confining the compatibility problem the adoption of "bracket standards"—i.e., a change in present black-

and-white standards so as to encompass a greater range of "lines" and "fields". The Commission stated that if it proved feasible promptly to adopt such new black-and-white standards, and if receiver manufacturers would promptly build black-and-white receivers capable of receiving the new range of standards, then the Commission could, consistently with the public interest, postpone final decision for a specified time because the new black-and-white receivers would, without further change, be able to receive CBS color signals in black and white and hence would be compatible (First Report, par. 150). The Commission expressly stated, however, that if bracket standards could not be promptly adopted and the new receivers built, a further delay would not be warranted and the CBS field sequential system would be thereupon adopted.[6]

Accordingly, concurrently with the First Report, the Commission issued a Second Notice of Further Proposed Rule Making (Exhibit C to Complaint) proposing the adoption of bracket transmission standards, and inviting comment, including alternative suggestions, from all interested persons. Thirty-three comments were received. These comments in general opposed adoption of bracket standards and indicated that the television receiver manufacturers could not or would not manufacture receivers with bracket standards within the time proposed by the Commission. No alternative suggestions for dealing with the problem of compatibility were advanced in any of the comments. On October 4, 1950, RCA also filed a petition (Exhibit E to Complaint) requesting that the Commission

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[6] Commissioners Hyde and Jones disagreed with the majority in that these two Commissioners believed that standards for the CBS system should be adopted without delay. Commissioner Hennock dissented on the ground that the postponement of adoption of the CBS standards to permit further experimentation under certain conditions was too short and should be extended to June 30, 1951.

review, between December 5, 1950 and January 5, 1951, claimed improvements made in the performance of its system, and that the Commission view further experimental broadcasts of the three proposed color systems during the period to June 30, 1951, before reaching a final determination.

On October 10, 1950 the Commission issued a Second Report (Exhibit G to Complaint), which noted that bracket standards could not be promptly adopted and bracket standard receivers would not be promptly made. Accordingly, as it had announced in its First Report, it concluded that the CBS field sequential color television system should be adopted. The Commission stated (Second Report, Par. 8) that since it had proven that there was no way to keep the compatibility situation in *status quo*, "we would be derelict in our responsibility to the public if we postponed a decision any longer. With no way of preventing the growth of incompatibility, the longer we wait before arriving at a final decision the greater the number of receivers in the hands of the public that will have to be adapted or converted if at a later date the CBS color system is adopted." Further, by delay the Commission "would be in the position of inviting the risk that if, after postponing a decision, the compatible color systems should again fail to meet the minimum criteria for a color system, as they have failed in the past, the number of receivers in the hands of the public would have increased to such a point where, as a practical matter, it might not be practicable to adopt an incompatible color system, even though we now know that such system meets all of the criteria for a color system" (Second Report, par. 6).

The Commission in its Second Report adverted to the four factors which had prompted it to seek a means of postponement without increasing incompatibility. As to

picture size, the Commission concluded that the public might well prefer a 12½ inch direct view color picture to a larger size black-and-white picture, and that in any event, adoption of the CBS standards would furnish a "healthy incentive" to develop a means—either the tri-color tube or some other apparatus[7] of producing larger size direct-view pictures (par. 12). In respect of "horizontal interlace", the Commission stated (par. 13) that if the technique should be successfully developed in the future, it could be superimposed on the then existing standards without affecting any black-and-white or color receivers already in the hands of the public. Similarly, in respect of "long persistence phosphors", the Commission noted (par. 14) that such phosphors, if and when developed, could be utilized in receivers made after such development so as to increase the possibilities of brightness without flicker; this, however, was also a matter of improved equipment which would not affect the already satisfactory equipment sold in the meantime.

In respect of the possibility of new or improved compatible color systems, the Commission stated (par. 15) that there had been no showing since the close of the hearings that such developments had been carried beyond the stage of "paper presentation" so as to warrant reopening of the hearing. To reopen on such a basis, the Commission noted

> "would be inviting the risk that these new systems might fail as have all color systems in the past which we have been urged to adopt in the ground of compatibility and the increase in number of receivers in the hands of the public would make it exceedingly difficult to adopt an incompatible system—a system which we know is satisfactory."

[7] Development of receiver apparatus capable of producing direct view pictures larger than 12½ inches under the CBS system would not involve a change in the system or in the standards adopted by the Commission.

The Commission did, however, explicitly leave the door open for the future consideration of new and improved systems (pars. 16 and 17).

Simultaneously with its Second Report, the Commission issued orders, (1) denying the RCA petition of October 4, 1950, to postpone a final determination, and (2) amending the Commission's Standards of Good Engineering Practice to permit the regular non-experimental transmission of color television in accordance with the field sequential standards which had been proposed by CBS.[8]

Argument

The question of adoption of standards permitting a regular non-experimental color television service is indisputably one of importance. Black-and-white television is a new, rapidly expanding and important medium of mass communication. The addition of color is, as the Commission found (First Report, pars. 120, 121), an "important" and "fundamental" improvement in television broadcasting; it "opens up whole new fields for effective broadcasting."

Despite the importance of the issues before the Commission, and the large public interest there involved, however, this appeal presents no substantial or novel legal questions.

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[8] Commissioners Sterling and Hennock dissented from the Second Report and the order amending the Standards of Good Engineering Practice. Commissioner Sterling dissented on the ground that further time should have been permitted to explore the adoption of bracket standards, and that a conference should have been held with the manufacturing industry to agree on a "realistic timetable." Commissioner Sterling agreed that if this procedure should not result "in a practical solution" to contain the compatibility problem, "I would then join the majority in authorizing the field sequential system." Commissioner Hennock dissented on the ground that compatibility was so desirable a feature that final decision should be postponed until June 30, 1951, to provide further opportunity for developing such a system. She also agreed, however, that if steps could not be taken within 60 or 90 days to arrest the growth of incompatibility by the adoption of bracket standards or some other means, standards for the field sequential system should then be immediately adopted.

The basic issues presented for resolution by the Commission were whether any television color system was sufficiently and satisfactorily developed to warrant standardization and if so, which of the systems proposed should be adopted. Plainly, these issues called for the making of specialized technical, economic and social judgments by the Commission which are necessarily within its particular competence. The judgments were made on the basis not only of a mass of complex and technical testimony, but also on extensive theoretical analysis and first-hand observation.

While the issues thus before the Commission were indeed difficult and complicated, involving the making of highly technical rules which operate in *futuro*, it is precisely for these reasons that its decision, once made and passed from the administrative to the judicial process, presents the classic case for judicial non-intervention. Without important exception, the contentions of appellants seek to raise questions only of the correctness of the Commission's decision in adopting standards for the CBS color system and refusing to adopt standards for the RCA color system, and of the wisdom of the Commission in resolving the various questions which were within its special area of discretion. It is elementary that in such circumstances, the Court will not substitute its judgment for that of an administrative agency. *National Broadcasting Company* v. *United States*, 319 U. S. 190; *Federal Security Administrator* v. *Quaker Oats*, 318 U. S. 218; *American Telephone & Telegraph Co.* v. *United States*, 299 U. S. 232.

1. *Substantial Evidence.* After extensive hearings evidence, demonstrations and technical analysis, the Commission made comprehensive findings and conclusions that on the one hand, the RCA system was not satisfactory and that many of its defects were inherent, and that, on the other hand, the CBS system met all the criteria for a

satisfactory color system. Plainly these findings find substantial support in the record.

Indeed, while appellants urged in the Court below, and urge here, that there was no substantial supporting evidence, they have failed to specify any of the multitude of findings alleged to be without such support. As stated by the Court below, "While the findings of the Commission are severely criticized, it is not contended in the main that they are not supported by substantial evidence." Even in respect of the few findings which appellants did attack in the Court below, they did no more than cite evidence which might have supported different findings. Plainly, this is not enough and raises no question worthy of consideration by this Court.

Nor do appellants' broader attacks on this score raise any serious issues. Even if, as appellants contend, the Commission rejected the testimony of "independent" industry experts and accepted only the testimony of CBS, CTI and FCC witnesses as the basis for its findings—something the Commission did not do[9]—no error would be

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[9] For examples of criticism of the RCA system by so-called "industry experts," see Tr. 4865, 5219, 5452, 5455, 5664, 5666-7, (lack of color fidelity), Tr. 5222 (inadequacy of brightness); Tr. 9458 (inferiority of overall definition); Tr. 5214, 9302, 9550 (picture texture); Tr. 5359, 5452, 9937 (small area flicker); Tr. 5217, 9377 (registration problems); Tr. 7450-1, 7962-3, 8093, 8202-3, 8245-6, 8249, 8270, 9380, 9687, 9956 (unreadiness and need for field testing); Tr. 7970, 8100, 8244, 10004-5 (camera complexity); Tr. 8192, 8202-3, 8205, 8390, 9687 (mixed highs principle); Tr. 8224-5, 8263-4 (susceptibility to interference).

While it is true that most of the "industry experts" opposed adoption of CBS standards, they did not advocate the adoption of the RCA system. On the contrary, they urged that no color standards be set and that the Commission wait for the development in the future of a satisfactory compatible system. In commenting on such testimony of these experts, the Commission stated (First Report, par. 139): "Moreover, the testimony of many of the parties was not based on field testing conducted by them or upon an analysis of field testing made by others but was merely recommendations and expert opinions. We cannot overlook the fact that many of these same parties offered recommendations and expert opinions of

involved. It is settled that it is not error even if an agency does reject all the testimony of one side, and accept that of the other side. *NLRB* v. *Pittsburgh SS Co.*, 337 U. S. 656; see also *United States* v. *Yellow Cab Co.*, 338 U. S. 338, 341.

Appellants are similarly in error in their contention that the findings adverse to the RCA system were based on evidence taken in earlier portions of the hearing and hence had been superseded by later developments. The Commission plainly had not only the right, but the duty, of making its determination on the whole record, and of deciding which evidence adduced in early stages remained applicable at the close of the hearings. The Commission's findings show on their face that they took into account developments and improvements in the RCA system made in the course of the hearing (e. g. par. 53, relating to receiver equipment and the development of the tri-color tube; par. 83, claimed correction of misregistration; par. 87, color fidelity). And there is, in any event, ample evidence in the record, adduced after the date of the claimed improvements, to warrant the Commission's findings.[10]

Further, appellant's contention that the Commission's determination was based "in important respects on 'speculation and hope' " is squarely refuted by the Commission's decision itself. In its First Report (Par. 146), the Commission expressed uncertainty concerning whether the di-

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the same kind as a basis of their advocacy in the 1946-7 hearing of the [RCA] simultaneous system—a system which never survived field testing."

[10] Examples of testimony adduced in 1950 (which appellant in the Court below designated as the cut-off date prior to which evidence concerning RCA was obsolete) and critical of the RCA system appears in the preceding footnote on page references after Tr. 6000. Other examples include Tr. 6254, 8460, 8610, 8880-2, 9268, 11205-7, 11242-6, 11334, 11470-1, 11491 (all relating to RCA's lack of color fidelity); Tr. 8460, 9279-80, 11257-8 (inadequacy of brightness); Tr. 9269, 11384, 11470-1, 11491 (system complexity); Tr. 6606, 8489, 11217 (picture texture); Tr. 8460, 11201, 11479 (misregistration).

rect-view receiver of CBS could be freed from existing picture size limitations, either by the use of the RCA tricolor tube or by some other means. This was one of the four factors which led the Commission, in its First Report, to postpone adoption of the CBS System; it stated that if some means could be devised to avoid aggravation of the incompatibility problem resulting from delay (*supra*, pp. 8-9), further development might establish whether or not the limitation on picture size remained and hence the Commission's ultimate decision would not be based on "speculation and hope" *on that question* alone. In its Second Report (par. 12), the Commission explicitly stated that its decision rested on the evidence that "CBS can produce satisfactory color pictures in projection receivers and on direct-view tubes of at least 12½ inches in size."

Clearly, therefore, the Commission's decision was not based on "speculation and hope" that larger size pictures might be developed; rather it was squarely based on the fact that the demonstrated size of 12½ inches was satisfactory and this size was not such as should bar the adoption of standards for the CBS System.

2. *The Reasonableness of the Commission's Decision.* Appellants also contend that the Commission's action in adopting standards for the CBS System and refusing to adopt RCA standards was arbitrary, capricious and contrary to the public interest. They center their attack on the grounds that the CBS System should not have been adopted because it is incompatible,[11] while the RCA system,

[11] Appellants have also contended that the Commission was arbitrary and capricious in not rejecting the CBS system because of alleged deficiencies in direct-view picture size and allegedly inadequate resolution. But the Commission's decision plainly shows that these factors were fully considered and that the Commission's refusal to insist on current unlimited picture-size and greater resolution was entirely rational. In these circumstances its judgment is decisive in this court.

it is urged, should have been adopted because it is compatible.

The Commission's decision readily establishes (First Report, pars. 123 and 124) that it carefully considered the question whether to insist on compatibility as a condition precedent to adopting a color system. Briefly summarized, the Commission found that while compatibility was desirable, it was less important than a satisfactory color system.

It found that compatible systems thus far proposed had gained compatibility only at the fatal expense of complexity or poor color quality, or both. It concluded that, based on a study of the history of ten years of development of color television

> "from a technical point of view, compatibility, as represented by all color television systems which have been demonstrated to date, is too high a price to put on color." [12]

And the Commission further noted that the problem of compatibility was transitional, and would progressively decrease in importance as new receivers capable of receiving CBS color signals came on the market and replaced existing sets.

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[12] Appellants mistakenly urge that the Commission's adoption of color standards which are incompatible with black-and-white standards constitutes a departure from principles enunciated by the Commission on May 28, 1940. In its Report of May 28, 1940, the Commission was dealing solely with black-and-white standards. In 1941, when the Commission first dealt with the question of color, it explicitly recognized and proposed different (and incompatible) standards for color than for black and white (First Report, Pars. 8 and 9). And again in 1947, when the Commission again considered color television, it stated that it was of the opinion that "compatibility is an element to be considered, but that of greater importance, if a choice must be made, is the development of the best possible system, employing the narrowest possible band width, and which makes possible receivers capable of good performance at a reasonable price." (First Report, par. 19.)

It is important to note that the issue of compatibility involving the effect on existing black and white sets, cannot properly be considered in isolation from the question of "convertibility"—i.e. the ability to "convert" existing sets so that they will produce *color* (as distinguished from black and white) pictures from color signals. As the Commission found, conversion of existing sets is possible under the CBS system at a reasonable cost (First Report, par. 106; see also Second Report, par. 10). Under the RCA system "no practical converter was demonstrated" and hence it "failed to meet the test of convertibility" (First Report, par. 103; Second Report, par. 10). In these circumstances, appellant's emphasis on the cost, alleged to amount to $1,500,000,000, of adapting and converting existing receivers to receive CBS color signals in color is misconceived since so far as the record shows, existing sets can never receive RCA color signals in color irrespective of cost.

In these circumstances, and particularly since the Commission found that the two compatible systems were inherently deficient, while the incompatible system met the criteria for a satisfactory system, plainly the Commission's refusal to insist on compatibility was a wholly rational judgment. Again, this was a judgment within its particular province. It cannot, therefore, be overturned.

Conversely, it is obvious that the Commission was not arbitrary or capricious, or otherwise legally in error, in refusing to adopt RCA standards, either alone or in conjunction with CBS standards, solely on the ground that the RCA system is compatible.

The fact that a system's signals can be received in black-and-white on existing receivers, does not make it unreasonable for the Commission to reject that system, where it is found to be inherently deficient and incapable of producing satisfactory color pictures. It was, on the contrary,

more reasonable for the Commission to conclude that to permit the regular commercial broadcasting of an unsatisfactory system, and thus to encourage the public to purchase RCA color receivers which cannot produce satisfactory color pictures would palpably not be in the public interest.

On this ground alone, the Commission was justified in not adopting standards for the RCA system, whether alone or as supplementary to CBS standards. But further, the Commission was not arbitrary or capricious in refusing to adopt "multiple standards"—i.e., two or more sets of standards for each of the several systems. In the entire history of broadcasting there always has been a single set of standards for regular non-experimental operation of the particular service involved. Inherent in the scheme of broadcasting is the concept that "competition" among several technical methods of transmitting the same broadcast service is precluded by the necessities of regulation in a field where diversities of systems may lead to the chaos which regulation is designed to prevent. There are compelling reasons for this: Multiple standards would be complex and confusing, and would result in the purchase either of unduly complicated and as yet undeveloped receivers, or of receivers which could receive only some of the color broadcasts and not others.[13]

In these circumstances, the Commission's refusal to adopt multiple standards was clearly within the area of its discretion and, therefore, appellants' contentions on this score raise no substantial issue.

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[13] Indeed, one of the major areas of agreement among the witnesses before the Commission related to "multiple standards": almost without exception, they agreed that it would be undesirable to set standards for more than one color system.

Baker, Tr. 9685-6; DuMont, Tr. 5729, 9412, 9416; Smith, Tr. 8173-5; Lippincott, Tr. 4701; Matthews, Tr. 11341; Stanton, Tr. 7116-34, 7216-20.

3. *The RCA "Progress Report" and the Condon Committee Report.* Appellants' contention that the Commission was in error in its treatment of the RCA "Progress Report" dated July 31, 1950 (Annex D of Exhibit D to the Complaint), and of the Condon Committee Report (Report of the Advisory Committee on Color Television to the Senate Committee on Interstate and Foreign Commerce) (Annex C of Exhibit D to the Complaint) raises no substantial question.

On July 31, 1950, two months after the hearing had been completed, RCA issued to the industry and transmitted to the Commission an informal "Progress Report." This report did no more than claim certain improvements in RCA equipment and technique. It embodied no unequivocal claims or descriptions of alleged improvements or developments with respect to color fidelity, misregistration, especially at the camera, criticalness of color control, or excessive susceptibility to interference, which the Commission had found among others, to be insuperable obstacles to the adoption of the RCA system. Indeed, at the time that RCA transmitted the report to the Commission, it did not request that the record be reopened or that the report be made a part of the record.[14]

The Progress Report was again submitted to the Commission by RCA on September 28, 1950, as an appendix to RCA's comments purportedly addressed to the question of the adoption of bracket standards. (See *supra*, pp. 9-10.) While the Second Notice of Further Proposed Rule Making which the Commission issued concurrently with its First

[14] In fact, three days later RCA implicitly repudiated any suggestion that the Commission's decision should be delayed to reopen the record for consideration of matters included in the Progress Report. On August 2, 1950 the Chairman of the Board of Directors of RCA wrote to the Chairman of the Commission, expressing opposition to delay and requesting prompt determination and the setting of standards. (Affidavit of Stanton filed in the court below.)

Report invited comments only on the question of bracket standards (Exhibit C to the Complaint), RCA seized on the opportunity thus presented to go far beyond the question of bracket standards and to attempt to reargue the merits of the Commission's First Report and the several color systems. In so doing RCA embodied not only the Progress Report but also a report of the Condon Committee Report which had been submitted to the Senate Committee in July 1950.

At the outset, it is clear that consideration by the Commission of either the Condon Report or the RCA Progress Reports as evidence upon the basis of which the findings and conclusions might have been modified would have been improper. The Commission had already held a full formal hearing on the record in which all parties had complete opportunity to adduce evidence and subject the claims and testimony of other parties to cross-examination and practical demonstration on the record. Were the reports to be given consideration as a basis for modified findings and conclusions, conformity with the prior course of the proceedings and fairness to the parties would have required that the record be reopened for the introduction of these reports as evidence subject to cross-examination by the other parties.

The most, then, that the Commission could have done with respect to these reports is to consider whether they afforded a basis for reopening the hearings. And, it is significant, in this connection, that RCA never requested that the record be reopened for this purpose. This may well have been because neither report contained anything which would have warranted such action—action, it must be remembered, which would have been in the nature of a grant of rehearing never sought by any of the interested parties.

(a) *The Condon Report:*—This report was prepared by a group of individuals at the request of the Chairman of the Senate Committee on Interstate and Foreign Commerce. It was, of course, a report only to the Senate Committee and it reached no determinative conclusions with respect to the several color systems. Such evaluations as were made of the systems were, as the Condon report itself states, based on written and oral evidence submitted in the Commission hearings, and the demonstrations which were part of those hearings (see paragraphs 15, 20, 25 of Condon Report). Thus the report referred to no new evidence relating to the systems before the Commission, and such conclusions as were embodied in it could not be considered as a basis for reconsideration. For, as the court below put it, "After all, Congress has conferred upon the Commission and charged it with the responsibility of conducting hearings and in reaching its own independent conclusions predicated thereon."

(b) *The R.C.A. Progess Report:*—This Report, as has been noted, was submitted twice to the Commission. It was no more than a collection of claims of improvements which do not go to the basic defects of the RCA system as found by the Commission. As the Commission stated in its Second Report (par. 15) with respect to "improvements in existing color systems which have been informally called to our attention since the hearings closed",

> a new television system is not entitled to a hearing or a reopening of a hearing simply on the basis of a paper presentation. In the radio field many theoretical systems exist and can be described on paper but it is a long step from this process to successful operation. There can be no assurance that a system is going to work until the apparatus has been built and has been tested. *None of the new systems or improvements in systems meet these tests so as to warrant reopening of the hearing.* [Emphasis supplied.]

The short and comprehensive answer to the appellants' present contention that the Commission erred in its treatment of each of the reports appears in paragraph 9 of the Commission's Second Report, it being remembered that the reports were submitted with the comments invited by the Commission's Final Report:

> . . . we have carefully considered all the material set forth in the comments, filed pursuant to our notice concerning bracket standards, as they are directed to the findings and conclusions in the Commission's First Report relating to the three color systems. Most of this material is merely a restatement of the parties' contentions made over and over again during the course of the hearing. These contentions have been analyzed in detail in the Report and no further discussion of them is necessary here.

The fact is that these reports were, with the exception of allegations of untested improvements, nothing more, in essence, than restatements of what had been once fully canvassed. Refusal to reopen the hearings on the basis of the tender of the reports, particularly in the light of the Commission's explicit statement that properly tested improvements would be considered at any time (see *supra*, p. 12), was hardly arbitrary.[15]

4. *Refusal to Postpone Final Decision.* On October 4, 1950, over a month after the Commission's Report reject-

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[15] Appellant's reliance on Section 4 of the Administrative Procedure Act is misplaced. Section 4 relates to an agency's consideration of written materials presented in rule-making proceedings where no formal testimonial hearing is held. Where, as in the instant case, an administrative agency holds such a formal hearing, it is clearly inappropriate for the agency to consider the sworn testimony adduced at the hearing in hotchpot with *ex parte* material submitted by one of the parties after the close of the hearings. The Administrative Procedure Act, of course, requires no such nullification of formal hearing procedures and the protection they are designed to afford the interested parties.

ing the RCA system, RCA filed a petition (Complaint, Exhibit E) requesting the Commission:

> "(a) During the period December 5, 1950 to January 5, 1951, to review improvements made in the performance of the RCA system; and
>
> (b) During the period to June 30, 1951, to review experimental broadcasts of color signals under the RCA, CBS, and CTI and other systems, before making a final determination in respect to color standards."

The petition contained no facts indicating the actual accomplishment of improvements.

There was clearly no abuse of discretion in not acquiescing in this request to keep the proceedings open at that time in view of the full opportunity given RCA to present its proposals, the already prolonged nature of the proceedings, including the hearing of testimony by 53 witnesses, the holding of eight record demonstrations, the filing of proposed findings and conclusions, and the detailed findings with respect to the defects in the RCA system contained in the First Report. Since the October 4, 1950 petition made no showing with respect to RCA's ability to remedy these basic defects, the Commission clearly did not abuse its discretion in refusing further to postpone final decision at that time. The petition was addressed solely to the Commission's discretion, and only a showing of the clearest abuse of that discretion would warrant a finding of error. *United States* v. *Pierce Auto Freight Lines*, 327 U. S. 515; *Interstate Commerce Commission* v. *City of Jersey City*, 322 U. S. 503.

Clearly, no such showing was made here. The Commission had given full consideration to the question of delaying a final decision in its First and Second Reports (First Report; Second Report, par. 6-15, par. 144-151, see *supra*, pp. 7-10). Most significantly, as we have seen, the Commis-

sion noted that since the CBS system was incompatible, every day of delay meant the continued aggravation of the compatibility problem by the sale of receivers which would require external adaptation. This problem was, and still is, one of constantly growing proportions. If, after a delay in a final decision, the compatible systems still proved to be unsatisfactory, and they gave little promise of satisfactory development because of inherent defects, the adoption of the field sequential system might prove to be impractical because of the greatly increased number of receivers in the hands of the public which would require adaptation.

Thus, upon the most comprehensive consideration and after a postponement from September 1 to October 10, 1950, to explore means for arresting the problem of compatibility if a final decision were to be postponed, the Commission concluded that a final decision should no longer be delayed.

The action of the Commission attacked, and sustained, in the District Court was thus a carefully reasoned policy decision based upon consideration of all relevant factors. It was an admittedly difficult decision, but one of exactly that nature which is within the informed competence of an administrative agency. It was a decision made with the sole aim of making available to the people of the United States at the earliest practical time a satisfactory system of color television. It was taken in recognition of the obvious fact that, particularly in a field such as television where technical improvements, even in black-and-white, constantly occur, there must be a stopping point somewhere if standards are ever to be set. Appellants can, therefore, not possibly show that this is so arbitrary "as to be the expression of a whim rather than an exercise of judgment," the showing appellants must make to secure a reversal of the District Court's judgment (*American Telephone &*

Telegraph Co. v. *United States*, 299 U. S. 232, at 236-7). Thus appellant has palpably failed to raise a substantial question on this score.

5. *The Participation of Edward Chapin in the Proceeding Before the Commission.* Appellants challenge the participation in the proceedings before the Commission of Edward W. Chapin, a Commission engineer, on the ground that he had invented an automatic switch usable with a non-compatible system. Mr. Chapin clearly had no financial interest in the matter since he and his co-inventor, William K. Roberts, executed an assignment to the Government of the United States in accordance with established Commission and Government-wide policy for the transfer of all such rights to the Government. The facts concerning the invention were completely disclosed on the record (R. 5980-5987), and while RCA objected to evidence concerning the invention, it made no objection at any tme to the continued participation of Mr. Chapin in the proceedings (R. 5980-5983). The allegations concerning Mr. Chapin disclose no substantial claim of bias by the Commission or any other legal er or.

Prayer for Affirmance

For the foregoing reasons, it is evident that no substantial question of fact or law is raised by this appeal. It is, therefore, respectfully submitted that the Final Judgment of the District Court should be affirmed and the temporory restraining order issued by that Court be dissolved.

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Supreme Court of the United States

OCTOBER TERM, 1950.

No. 565.

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., RCA VICTOR DISTRIBUTING CORPORATION, *et al.*,

Appellants,

against

UNITED STATES OF AMERICA, FEDERAL COMMUNICATIONS COMMISSION, AND COLUMBIA BROADCASTING SYSTEM, INC.,

Appellees.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES FOR THE NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION.

REPLY TO MOTION TO AFFIRM.

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February 26, 1951.

INDEX

Subject Index

	PAGE
Reply to Motion to Affirm	1
Statement	1
The questions involved in this appeal are substantial	4
Argument	6
A. Transmission standards providing for television broadcasts which cannot be received on any of the 12,000,000 receivers in the hands of the public are contrary to the public interest	6
B. The Commission's record is admittedly inadequate; it has violated its duty to inform itself and to take account of determinative facts	11
Admitted inadequacy of administrative record	11
Commission's violation of obligation to inform itself	15
Commission's refusal to consider relevant matter presented violated the Administrative Procedure Act	20
C. Prohibition of broadcasting of compatible system in competition with incompatible system is contrary to law	22
Limitation on competition	23
Absence of required findings	25
D. The errors of the District Court	29
E. No administrative agency should rely on an interested staff member	32
Conclusion	34

Table of Cases Cited

	PAGE
American Power & Light Co. v. *Securities and Exchange Commission*, 329 U. S. 90 (1946)	34
Ashbacker Radio Corp. v. *Federal Communications Commission*, 326 U. S. 327 (1945)	28, 34
Civil Aeronautics Board v. *State Airlines, Inc.*, 338 U. S. 572 (1950)	34
Colorado-Wyoming Gas Co. v. *Federal Power Commission*, 324 U. S. 626 (1945)	28
William Cramp & Sons Ship and Engine Building Co. v. *International Curtiss Marine Turbine Co.*, 228 U. S. 645 (1913)	31
Eastern-Central Ass'n v. *United States*, 321 U. S. 194 (1944)	28
Federal Communications Commission v. *Sanders Brothers Radio Station*, 309 U. S. 470 (1940)	25
Federal Communications Commission v. *WJR, The Goodwill Station, Inc.*, 337 U. S. 265 (1949)	31
Ex parte In the Matter of Harley-Davidson Motor Co., 259 U. S. 414 (1922)	31
Insurance Group Committee v. *Denver & Rio Grande Western R.R.*, 329 U. S. 607 (1947)	34
Lutcher & Moore Lumber Co. v. *Knight*, 217 U. S. 257 (1910)	31
National Broadcasting Company v. *United States*, 319 U. S. 190 (1943)	34
National Labor Relations Board v. *Fansteel Corp.*, 306 U. S. 240 (1939)	28

PAGE

Oklahoma Natural Gas Co. v. *Russell*, 261 U. S. 290 (1923) 31

Panama Refining Co. v. *Ryan*, 293 U. S. 388 (1935) 28

Patterson v. *Lamb*, 329 U. S. 539 (1947) 34

Phelps Dodge Corp. v. *National Labor Relations Board*, 313 U. S. 177 (1941) 28

St. Louis, Kansas City and Colorado R.R. v. *Wabash R.R.*, 217 U. S. 247 (1910) 34

Securities and Exchange Commission v. *Chenery Corp.*, 318 U. S. 80 (1943), 332 U. S. 194 (1947) 28

Jacob Siegel Co. v. *Federal Trade Commission*, 327 U. S. 608 (1946) 26, 27, 28

Thomas Paper Stock Co. v. *Porter*, 328 U. S. 50 (1946) 28

United States v. *Baltimore & Ohio R.R.*, 293 U. S. 454 (1935) 28

United States v. *Carolina Freight Carriers Corp.*, 315 U. S. 475 (1942) 28

United States v. *Chicago, M., St. P. & P.R.R.*, 294 U. S. 499 (1935) 28

Yonkers v. *United States*, 320 U. S. 685 (1944) 28

STATUTES CITED

Administrative Procedure Act

Section 4(b) 20, 21, 22

Communications Act of 1934 ..... 7, 12, 17, 22, 23, 24

Section 303(g) 15, 16

Radio Act of 1927 22

Other Authorities Cited

	PAGE
Davis, *Official Notice*, 62 Harv. L. Rev. 537, 542 (1949)	18
16 FCC Ann. Rep. 13-14 (1950)	21
FCC, Report of the Commission in the Matter of Order No. 65 Setting Television Rules and Regulations for Further Hearing, Docket No. 5806, May 28, 1940	6, 7, 13, 19
FCC, Report, March 18, 1947 (11 F. C. C. 1523)	7, 8, 11, 13
Landis, The Administrative Process (1938)	18
Sen. Doc. No. 197, 81st Cong., 2d Sess. (1950)	16

Supreme Court of the United States

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Appellants,

against

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Appellees.

Appeal from the District Court of the United States for the Northern District of Illinois, Eastern Division.

REPLY TO MOTION TO AFFIRM.

Statement.

This reply is filed by appellants Radio Corporation of America, National Broadcasting Company, Inc. and RCA Victor Distributing Corporation.

Appellants' Statement as to Jurisdiction sets forth the questions presented by this appeal. Contrary to appellees' contention, these questions are not only substantial but in most instances they are questions of first impression, and should be passed upon by this Court.

Some of the basic and controlling facts which establish the great public interest involved in this appeal are as follows:

The order here sought to be reviewed would put into commercial operation a system of color television from whose transmissions none of the nearly 12,000,000 sets now in the hands of the public would be able to receive any picture whatsoever.*

This means that if a television program is broadcast in accordance with the color television standards adopted by the Commission, none of the more than 45,000,000 people who now comprise the television audience would be able to get that program. Those of the 45,000,000 people who are accustomed to looking at a particular program would for the first time be unable to see that program when it is broadcast in accordance with the CBS standards adopted by the order.

This is what the incompatibility of the CBS color system means.

Each set owner would have to spend $50 or more, or a total of over half a billion dollars, to restore the program service which the 12,000,000 owners of television sets now receive. Even if this expenditure were made, the picture obtained from CBS color transmissions would be only a degraded black and white picture having less than half the detail of present black and white television pictures (Statement as to Jurisdiction, p. 48).

The addition of CBS color converters, which utilize spinning discs of red, green and blue filters, would require the 12,000,000 people who now own television receivers to incur the further expense of well over a billion dollars.

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* The figures referred to by the District Court were as of November, 1950 (Statement as to Jurisdiction, pp. 39, 48). At that time there were more than 9,000,000 television receiving sets in the hands of the public and a television audience of 35,000,000 people. Estimates as of three months later indicate that there are now nearly 12,000,000 television receiving sets in the hands of the public representing an investment of nearly $3,000,000,000, and a total television audience of 45,000,000 people.

Again, the picture so obtained would have less than half the detail of that provided by the existing service.

In addition, the spinning disc converters are cumbersome and involve a limitation of picture size to 12½ inches. In contrast, more than 90% of the television sets sold today have a picture size of 16 inches or larger.

The growth of television has been based upon the high-quality transmission standards for black and white television which were unanimously recommended by the industry and were adopted by the Commission in 1941.

Under these standards every television transmitter is receivable by every television receiver within its range. Under the order this will no longer be true.

The development of television is an achievement without parallel in American industry. The number of receivers in the hands of the public has grown from 15,000 in January 1947 to nearly 12,000,000 at this time, representing an investment by the public of more than $3,000,000,000. The television broadcasting service has correspondingly grown. It now provides the public with more than $150,000,000 of programs a year.

The Motion to Affirm states that the purpose of the Commission in adopting transmission standards is to ensure that there will always be a single set of standards for the regular commercial operation of the particular service involved (p. 3). In spite of this, the principle that every television transmitter must be receivable by every television receiver within its range has been discarded by the order. The order of the Commission here under review for the first time in the history of the federal regulation of radio provides for two incompatible sets of operating standards for a single set of channels.

The reciprocal relationship between the number of receivers in the hands of the public capable of receiving a service and the ability of the broadcaster to furnish a service to those receivers is basic to the economics of all broadcasting.

Except for CBS—the proponent of an incompatible system—the electronics industry, which created television and which has been responsible for its development, agreed that a satisfactory compatible color system was attainable. With the same exception, not a single witness testified that it was necessary or even desirable to adopt an incompatible color system in order to obtain color television.

In order to adopt color standards incompatible with existing standards it was necessary for the Commission expressly to repudiate and attempt to discredit the entire body of industry engineers upon whom it has heretofore relied.

In authorizing the broadcasting of an incompatible system, the Commission not only disregarded the almost unanimous position of industry experts, but it adopted an order which has the effect of prohibiting the broadcasting of compatible color in competition with incompatible color. This was done even though the uncontradicted evidence is that the broadcasting of compatible color would hurt no one.

The Questions Involved in This Appeal are Substantial.

The only issue presented by the appellees' Motion is whether the questions raised by this appeal are worthy of consideration and decision by this Court. The discussion which follows is directed solely to answering this contention. Full argument of the merits of the questions presented, as set forth in the Statement as to Jurisdiction and the Assignment of Errors, is reserved for the briefs and oral argument on the merits.

The facts heretofore set forth establish the magnitude of the public interest involved in this appeal.

Further, this is the first time that the federal regulation of this new and great television industry has come before this Court.

Preliminarily, it may be noted that the Motion to Affirm concedes the large public interest and the importance of the issues involved. The basis upon which appellees urge this Court not to hear the appeal is their contention that appel-

lants seek to raise questions "only of the correctness of the Commission's decision" and "of the wisdom of the Commission".

Appellants are convinced that the Commission's decision was both wrong and unwise.

That appellants have this conviction is no ground for denial of judicial review, particularly where, as here, the error so adversely affects the public interest—which this Court has said is the touchstone of the Communications Act—as to constitute an arbitrary and capricious exercise of power.

In attacking the Commission's decision, appellants raise important and substantial questions of far-reaching legal consequence. These include questions as to the scope of the authority of the Commission to regulate television through the promulgation of transmission standards—never before passed upon by this Court—and as to the way in which that authority should be exercised.

In addition, this appeal raises far-reaching legal issues with respect to the administrative process and the application and construction of the Administrative Procedure Act.

Appellants also call the Court's attention in this connection to the fact that the order under review was arrived at by a divided Commission and passed on by a divided District Court. Although the majority of the District Court dismissed the complaint and granted summary judgment for appellees, it also raised the question why it should "devote the time and energy which the importance of the case merits, realizing as we must that the controversy can only be finally terminated by a *decision* of the Supreme Court" and that the controversy "badly needs the finality of *decision* which can be made only by the Supreme Court"* (Statement as to Jurisdiction, pp. 29, 38).

This construction of the case was enjoined upon the District Court by the appellees below when they urged that court to speed the case to this Court. Having convinced the District Court that its consideration was "little more than a practice session" for the instant appeal, the appellees

* Italics ours throughout.

now seek to deprive appellants of any review whatever by asking this Court not to hear the case (*Id.* at p. 29).

The importance of the legal issues involved and the necessity for a decision by this Court on those issues are discussed below.

ARGUMENT.

A. Transmission Standards Providing for Television Broadcasts Which Cannot Be Received on Any of the 12,000,000 Receivers in the Hands of the Public are Contrary to the Public Interest.

The transmission standards adopted by the order under review were tailored to fit the incompatible CBS system and no other. The adoption of a system of television broadcasting which cannot be received on any of the 12,000,000 receivers owned by the public is so drastic as in and of itself to bespeak arbitrary and capricious action. Before such a change becomes effective, it should be reviewed by this Court.

These standards have been adopted although it has been impossible to make the CBS system compatible. On the other hand, compatibility has been achieved. The Commission found, and the appellees' Motion concedes, that the RCA color system is compatible.

An incompatible system is, therefore, nothing more or less than an unready system. Incompatibility is a basic defect in a color system. It is a problem for the research laboratory. The cost of achieving compatibility should be borne by the developer of a color system. It should not be passed on to the public—as the Commission has done in this case.

In defining transmission standards in its May 28, 1940 Report the Commission stated:

> "Transmission standards may be simply defined as engineering rules governing the characteristics of the radio signal transmitted by the operation of radio apparatus. Such standards as a practical matter

> must require a fair degree of efficiency and assure to the public in basic outline a single uniform system of broadcasting which will enable every transmitting station to serve every receiver within its range.'"*

The basic authority of the Commission to prevent electrical interference between broadcasting stations involves the allocation of particular frequencies to particular services and the licensing of broadcasters to use such frequencies in certain locations. These activities of the Commission have often been presented to the courts.

The activities of the Commission in setting television transmission standards have never been before the courts.

No express authority for the setting of transmission standards is to be found in the Communications Act of 1934. However, no one has questioned the desirability of achieving the results described by the Commission in its May 28, 1940 Report, namely to provide:

> ". . . a fair degree of efficiency and assure to the public in basic outline a single uniform system of broadcasting which will enable every transmitting station to serve every receiver within its range."*

As stated in the Motion to Affirm, the Commission has heretofore adopted technical transmission standards which have assured that the public would receive a uniform satisfactory service. There has always been a single set of standards for regular commercial operation of the particular service involved in the use of a particular set of channels. Appellants urged this fact upon the court below and quoted extensively from the Commission's own Reports of May 28, 1940 and of March 18, 1947, which were concerned with television transmission standards.

Both in the court below and before this Court the appellees seek to distinguish these prior Commission Reports by pointing out that in 1940 and in 1947 it was contemplated that color broadcasting might require different standards from black and white.

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* *Report of the Commission in the Matter of Order No. 65 Setting Television Rules and Regulations for Further Hearing, Docket No. 5806*, p. 2 (May 28, 1940).

What the Commission has failed to point out either to this Court or to the court below are the facts that:

1. In 1940 there were virtually no television receivers outstanding, and very few in March 1947;

2. In so far as it was contemplated in 1947 that color broadcasting might require different standards from black and white, it was also contemplated that color television occupy a different portion of the radio frequency spectrum than the black and white service;*

3. In contrast, it is now accepted that color television will occupy the same portion of the radio spectrum as the existing television service; and

4. Not until millions (let alone the present billions) of dollars were actually invested by the public in television receivers did compatibility become a practical necessity.

The order of the Commission here under review is an abrupt departure from the Commission's past practice and policy with respect to television transmission standards.

In their Motion, appellees seek to justify the Commission's failure to require compatibility on the basis of the Commission's statement in its First Report that:

> "based upon a study of the history of color development over the past ten years . . . from a technical point of view compatibility, as represented by all color television systems which have been demonstrated to date, is too high a price to put on color." (¶123)

Any study of the "history of color development over the past ten years" from a "technical point of view" or any other point of view would have established that:

1. Many of the past ten years were war years, when weapons for the preservation of this country

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* See FCC, REPORT, March 18, 1947, 11 F. C. C. 1523.

were the subject of research and development—not color television;

2. Television did not really start until about four years ago; and

3. The present recognition that color television should occupy the same 6-megacycle channels as black and white television did not come until 1948.

Instead of the ten-year period referred to by the Commission, it is appropriate to talk only about a two-year period in so far as the development of compatible 6-megacycle color television is concerned. In this short period of time it is conceded that immense strides have been made.

Except for CBS—the proponent of the only incompatible system—the electronics industry, which created television and which has been responsible for its development, agreed that a satisfactory compatible color system was attainable. With the same exception, not a single witness testified that it was necessary or even desirable to adopt an incompatible color system in order to obtain color television.

The District Court did not pass upon the scope of the power of the Commission to adopt transmission standards in general or the specific transmission standards involved in this appeal.

The reason assigned by the District Court for not vacating the order and sending the proceedings back to the Commission for further consideration with respect to the existence of a satisfactory compatible system was the alleged necessity for the finality of decision which could be made only by this Court, a course of action which had been urged upon the District Court by appellees (Statement as to Jurisdiction, p. 38).

In addition, the dissent of District Judge La Buy states as follows:

> "It is conceded by all and it is self-evident that the best system of color television is a compatible one; that is, a system requiring no change whatever in existing receivers for the reception of black and

white as well as color pictures. Indeed, compatibility is the coveted goal of all engineers and scientists engaged in the television industry.

• • • • • •

"It is my opinion the Commission's precipitous action in entering the order, the impact of which will require owners of television sets to install equipment at a cost of many hundreds of millions of dollars, and its refusal to hear additional evidence clearly indicates an abuse of discretion and constituted action which was arbitrary and capricious." (*Id.* at pp. 42, 44)

Indeed, the President of CBS testified before the Commission that CBS would "love" to have compatibility.

In this dynamic art and in light of the fact that everyone, including CBS, agrees that compatibility is of the first importance, one would expect to find compelling technical reasons advanced for the adoption of the incompatible CBS system. This is not the case. On the contrary, the Reports of the Commission are replete with faint praise of the incompatible CBS system. *What the Commission has had to do in order to adopt the CBS system is to distort the most compelling reason for the rejection of that system—its incompatibility—into the sole reason for its adoption now.*

Appellants respectfully submit that they are entitled to a judicial determination of whether the Commission has the authority to set transmission standards which do not provide a single set of standards for a single service in a single set of channels.

The industry has invested hundreds of millions of dollars and the public has invested billions of dollars to create and receive a television service which the order would disrupt.

Appellants further respectfully submit that the action of the Commission in disrupting this service directly contravenes the Commission's statutory obligation to protect the public interest, and is arbitrary and capricious.

B. The Commission's Record Is Admittedly Inadequate; It Has Violated Its Duty To Inform Itself and To Take Account of Determinative Facts.

Admitted Inadequacy Of Administrative Record.

The First Report of the Commission makes it clear that this is not a case in which the Commission can properly claim that the record supports its order. Indeed, the Commission cannot properly claim even to have completed such a record.

The CBS incompatible color system dates back to 1940. It was rejected by the Commission in 1947 for defects which it still has, as well as because it required 16 megacycles to give picture detail comparable to that provided by existing television standards.* In the present 6-megacycle channels, the CBS system has less than half the picture detail of the existing black and white standards.

The RCA compatible all-electronic color television system is relatively new. This system utilizes the principles of the RCA simultaneous system first demonstrated in 1946 which required 14 megacycles.** The development of the RCA color system to the point where it would operate in a 6-megacycle channel, without sacrificing picture detail, took place in 1949.

As successively demonstrated during the hearings, and since, the RCA system has improved in practical operation

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* FCC, REPORT, March 18, 1947, 11 F. C. C. 1523.

** In 1947 the Commission noted that it would take from four to five years to develop this system into a commercial service. In 1948 the Commission still regarded four or five years as an appropriate period of time for the commercial development of the RCA color system. This fact is to be compared with the Commission's present statement that a review of the last ten years indicates the unlikelihood of the commercial development of the RCA compatible system. The RCA system has not only been developed into a commercial reality, but, in addition, has been put into 6 megacycles in less than the time contemplated in 1947 and 1948.

by leaps and bounds. This is conceded by all (Statement as to Jurisdiction, pp. 34-35).*

On the other hand, the CBS incompatible system has remained basically as it was in 1940. A mechanical disc is still used, with its inherent limitations on picture size, rather than electronic means, to produce color.

In this state of affairs, the Commission issued its First Report of September 1, 1950, the taking of testimony having ended in May, 1950. In this Report, the Commission purported to evaluate both systems, *but adopted neither.*

As indicated, the RCA system was new. Nevertheless it had, as the Motion to Affirm concedes, solved the all-important problem of compatibility. In addition, RCA had only late in the hearings developed and demonstrated the tri-color picture tube, one of the greatest inventions in the television art.

Accordingly, the Commission, recognizing that "fundamental research cannot be performed on schedule" and that "much of the fruit of this research is only now beginning to emerge", stated that it wished more time before freezing standards for color.

This conclusion was in accord with the Commission's consistent past practice and with the mandate of the Communications Act of 1934.

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* For example, the record reflects the following comments of members of the Commission with respect to the RCA system:

The Acting Chairman of the Commission stated to an RCA witness on the record on April 11, 1950 that

> "... your picture is greatly improved since your first showing." (Tr. 8516)

Another Commissioner commented on March 16, 1950:

> "... we have seen that [the RCA system] and *it produced beautiful color.*" (Tr. 6900)

The same Commissioner also stated on February 27, 1950:

> "I noticed the marked improvement in your color the other morning at Laurel, and I think we all did, and I was completely surprised by the *life-like reproduction*, particularly in the final RCA picture, where the man inserted flowers in that shallow dish." (Tr. 6130-31)

In refusing to adopt television standards in 1940, the Commission stated in its Report of May 28 of that year:

> "It would be a violation of its statutory obligations for the Commission to disregard any facts which might foreclose a proper exercise of its duty to fix transmission standards . . . ." (p. 19)

This principle of administrative construction was reaffirmed by the Commission in its Report of March 18, 1947, which rejected the CBS system. The Commission then said:

> "Before approving proposed standards, the Commission must be satisfied not only that the system proposed will work, but also that the system is as good as can be expected within any reasonable time in the foreseeable future." (11 F. C. C. 1523, 1525)

On the other hand, the Commission in this case also found defects in the CBS incompatible system, ten years old and at least once rejected as it was, which the Commission thought should be overcome before adoption, even assuming that an incompatible system should in any case be adopted. These limitations were susceptibility to flicker, low picture detail, and limited picture size.

The Commission stated *as to all three of these limitations** that the adoption of the CBS system would mean that the Commission was

> "compelled to *speculate* as to an important basis for its decision. . ."

and that

> "the Commission's determination on an important part of its decision would be based on *speculation and hope*. . . ."

In spite of these clear statements that a decision could not properly be made without further information and further opportunity for the development of all systems, the

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* Not, as the Motion to Affirm says, only as to the limitations on picture size. See First Report, ¶¶146-47.

Commission on October 10, 1950 adopted standards for the CBS incompatible system without receiving such further information as to the CBS system, refusing to consider further information with respect to the RCA system, and without according opportunity for further development.

Another point raised by this appeal relates to the illegality of the conditions upon which the Commission stated it would take the time it considered necessary to inform itself with respect to the matter before it. Both conditions were unlawful and one was impossible. These are discussed in the Statement as to Jurisdiction and in the Reply of Intervener-Appellant Emerson Radio & Phonograph Corporation and, for that reason, will not be discussed here.

The significant point here is that the Commission recognized in its First Report that the record of the hearings before it was inadequate to enable it to discharge its duties. The Commission nevertheless failed to inform itself as to matters it recognized it should.

Whether the Commission can base a decision upon a record which its own Report has stated is inadequate clearly presents a novel and substantial question for this Court to decide.

Indeed, in this very connection the majority of the District Court said of the Commission's refusal to further inform itself:

> "Admittedly, much progress was made during the latter portion of the hearings and, as claimed, after the hearings closed, in the development of a compatible system of color television. Particularly was such progress made by RCA, and as we view the situation the most plausible contention made by plaintiffs is that the Commission abused its discretion in refusing to extend the effective date of its order so that it might further consider the situation, and particularly the improvement which it is claimed had been made by RCA and others." (Statement as to Jurisdiction, pp. 34-35)

In dissenting from the decision of the District Court, Judge La Buy stated:

> "... it is difficult to understand why the Commission refused to hear additional evidence and chose instead

> a course of action, using its own words, based 'on speculation and hope rather than on demonstrations.'" (*Id.* at p. 44)

Furthermore, as set forth in the Statement as to Jurisdiction, in so far as the Commission made findings based upon evidence in the record, it in many instances relied squarely upon clearly superseded evidence in reaching its result. In a situation of this kind where a dynamic science is involved, it is clear that findings which are based in whole or in part upon superseded evidence cannot be findings based upon substantial evidence. This is an important and unique question.

As stated by the majority of the District Court:

> ". . . a number of critical findings [of the Commission] are based upon evidence which was taken in the earlier stage of the proceeding which is not representative of the situation as it existed at the time the findings were adopted." (*Id.* at p. 34)

The District Court thus recognized the existence of the question. But it did not pass upon it, nor has any decision of this Court ever dealt with that question.

Commission's Violation of Obligation To Inform Itself.

The instant case presents a substantial question as to the duty of the Commission, under the Communications Act of 1934, to inform itself during a rule-making proceeding of relevant and significant scientific data fully available to it.

In a rule-making proceeding, appellants contend that the Communications Act* requires the Commission to con-

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* For example, Section 303(g) provides as follows:

> "Except as otherwise provided in this Act, the Commission from time to time, as public convenience, interest, or necessity requires, shall—
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> • • • • • •
>
> "(g) Study new uses for radio, provide for experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest" (48 Stat. 1082, as amended, 50 Stat. 190, 191; 47 U. S. C. §303(g)).

sider all pertinent information submitted to it prior to the issuance of rules. This obligation exists so that the Commission will have a sound informed basis on which to formulate policies in the best interests of the public.

The action of the Commission in this case indicates that it believes its responsibility to the public ceased when the testimony was completed. On that theory it refused to consider information of controlling significance concerning scientific developments submitted to it after the testimony was completed on May 26, 1950, but prior to its order.

The order of the Commission was issued October 11, 1950. On the previous July 10 the Condon Report* was published. On July 31, 1950 RCA submitted its Progress Report** to the Commission.

After the Commission in its First Report of September 1 refused to consider this information, RCA submitted these Reports as part of its Comments, which had been requested by the Commission at the time it issued its First Report.

Each of these Reports was relevant and significant. The Progress Report contained data on new developments in the performance of the RCA system which showed that certain criticisms leveled at the system by the Commission were without merit.

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* The Condon Committee was headed by Dr. Edward U. Condon, Director of the National Bureau of Standards. This committee consisted of "a small group of scientific persons of repute, none of whom are employed by or have any connection directly or indirectly with any radio licensee or radio-equipment manufacturer", and was organized at the request of the Chairman of the Senate Committee on Interstate and Foreign Commerce to give "sound, impartial, scientific advice" on color television. The Report is printed as SEN. Doc. No. 197, 81st Cong., 2d Sess. (1950).

** The RCA Progress Report, submitted to the Commission first on July 31, 1950, reported the accomplishment of various improvements in the RCA system and color equipment which had been referred to prior to the close of testimony on May 26, 1950.

With respect to the Condon Report, the majority of the District Court stated:

> "No doubt this report refutes numerous of the findings made by the Commission and gives a far more favorable appraisement of the RCA system than that attributed to it by the Commission." (Statement as to Jurisdiction, p. 36)

However, the Commission never did consider the information in these Reports (Defendants' Brief in District Court, p. 28 and Motion to Affirm, p. 21).

Moreover, on October 4, 1950, RCA formally petitioned the Commission, before making a final determination in respect of color standards, to review the improvements made in the performance of the RCA system and to view experimental broadcasts of color signals of the RCA, CBS and other systems.

Meanwhile, others, including the General Electric Company and the Hazeltine company, had also called the Commission's attention to further developments in compatible, all-electronic, high-definition color television systems.

Nevertheless, the Commission refused to consider any of these important developments and denied the RCA Petition out of hand. On October 10, 1950 the Commission adopted its Second Report, concluding, *without looking at them*, that no improvements in compatible systems warranted a reopening of the record.

The Commission swallowed its own expressed *"speculation and hope"* about the CBS system and adopted it finally without going into the matters with respect to which it said it should have further information.

The Commission in its First Report had recognized that

> "the institution of these proceedings stimulated great activity in the color field and that since fundamental research cannot be performed on schedule, it is possible that much of the fruit of this research is only now beginning to emerge." (¶148)

The Commission's refusal to inform itself contravenes not only the Communications Act but also a basic tenet of administrative rule-making.

One of the chief purposes underlying the creation of the administrative process was the need for a flexible governmental body—a body possessed of the procedural latitude necessary to gather and to consider all relevant information when it was engaged in the promulgation of rules affecting the public interest. It was recognized that the judicial process, circumscribed as it is by various formalities, including a formal record, was less adapted to cope with many of the complexities of modern civilization.

As stated by James M. Landis in *The Administrative Process* (1938):

> "One other significant distinction between the administrative and judicial processes is the power of 'independent' investigation possessed by the former. The test of the judicial process, traditionally, is not the fair disposition of the controversy; it is the fair disposition of the controversy *upon the record as made by the parties**. . . . the judge must not know of the events of the controversy except as these may have been presented to him, in due form, by the parties." (pp. 37-38)

In contrast,

> "For that [administrative] process to be successful in a particular field, it is imperative that controversies be decided as 'rightly' as possible, independently of the formal record the parties themselves produce. The ultimate test of the administrative is the policy that it formulates; not the fairness as between the parties of the disposition of a controversy on a record of their own making." (p. 39)

Similarly, Kenneth Culp Davis, Professor of Law at The University of Texas, has stated:

> "Congress has assigned to each regulatory agency the affirmative duty of securing all relevant information, whether produced by the parties or not."**

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* Italics in original.

** *Official Notice*, 62 HARV. L. REV. 537, 542 (1949).

In the setting of standards for AM and FM sound broadcasting and for television the Commission has heretofore recognized that its mandate to serve the public includes a broad responsibility to consider relevant information from all sources, whether oral or written. For example, the Commission has stated that its standards are based upon the best engineering data available, including evidence at hearings, conferences with radio engineers and data supplied by manufacturers of radio equipment and by licensees of broadcast stations.

In refusing to adopt television standards in 1940, the Commission stated in its Report of May 28 of that year:

> "It would be a violation of its statutory obligations for the Commission to disregard any facts which might foreclose a proper exercise of its duty to fix transmission standards . . . ." (p 19)

However, in these proceedings the Commission refused to consider relevant matter either formally presented to it or informally brought to its attention.

Thus, the case involves the important question as to whether an agency, which is under a duty to promote the public interest and which is engaged in a rule-making proceeding involving the evaluation of a dynamic science, can lawfully refuse to inform itself of pertinent and determinative scientific data fully available to it.

Further, contrary to all the principles of administrative law, the Commission has gone so far in these proceedings as to state that it was legally precluded from considering such material. Thus, the Motion to Affirm repeats the position taken by the Commission before the District Court to the effect that consideration by the Commission of either the Condon Report or the RCA Progress Report would have been legally improper (Motion to Affirm, p. 21).

Any such position would seem obviously to present a substantial question requiring decision by this Court. If administrative agencies are to take the position that they are legally precluded from considering pertinent facts in a rule-making proceeding, the administrative process is certain to stultify itself.

Commission's Refusal to Consider Relevant Matter Presented Violated the Administrative Procedure Act.

The instant case presents a substantial and novel question with respect to the construction of the Administrative Procedure Act. This question is of general interest and concerns both the practices of the Federal Communications Commission and those of other federal administrative agencies as well.

The question arises from the refusal of the Commission to consider the RCA Progress Report and the Report of the Condon Committee, even though these were submitted to the Commission in RCA's Comments which were requested by the Commission in the proceedings before it. Whether or not the Commission had a duty under the Administrative Procedure Act to consider these Reports depends upon the construction of Section 4(b) of that Act. Under the construction of the Act which appellants believe proper the Commission had the affirmative statutory duty to consider these Reports. The appellees in their Motion argue for a contrary construction.

Section 4(b) of the Administrative Procedure Act (60 Stat. 238; 5 U. S. C. §1003(b)), dealing with rule-making proceedings, provides in part:

> "After notice required by this section, the agency shall afford interested persons an opportunity to participate in the rule making through submission of written data, views, or arguments *with or without opportunity to present the same orally in any manner;* and, *after consideration of all relevant matter presented,* the agency shall incorporate in any rules adopted a concise general statement of their basis and purpose."

Appellants believe that this requirement that the administrative agency shall consider

> ". . . *all* relevant matter presented . . ."

means just what it says.

But the Commission has admitted that it did not consider the Report of the Condon Committee nor the RCA Progress Report. In respect of the former, for example, it said in its brief in the District Court:

> "It is obviously improper to consider such a report . . ." (p. 28).

Although the proceedings before the Commission were clearly rule-making proceedings, the appellees now attempt to justify the Commission's refusal to consider "relevant matter presented" on the ground that somehow this rule-making proceeding was different from other rule-making proceedings. They endeavor to differentiate on the ground that in this proceeding there was a "testimonial hearing" (Motion to Affirm, p. 23).

This differentiation, it is submitted, is not in accord with the statute. Nor is it in accord with the Commission's express statement that in establishing "rules and regulations, *and engineering standards*, . . . it *must conform to the Administrative Procedure Act* which prescribes uniform rule-making practices for Federal agencies to follow." (16 FCC Ann. Rep. 13-14 (1950)).

The statute provides that interested persons shall be given an opportunity to "participate in the rule making through submission of written data, views, or arguments *with or without* opportunity to present the same orally in any manner. . . ." The statute does not set up two alternative procedures—one covering written data and the other an oral presentation. It shows on its face that the oral presentation is *in addition to* the "written data, views, or arguments". The statute directs that the agency shall consider "*all* relevant matter presented". The word "*all*", it is submitted, covers both the written and the oral presentations.

It is submitted that Section 4(b) of the Administrative Procedure Act does not permit an agency to refuse to consider written data submitted in those cases in which any

opportunity for oral presentation is afforded nor to pick and choose what relevant matter it will consider.*

C. Prohibition of Broadcasting of Compatible System in Competition with Incompatible System is Contrary to Law.

In addition to, but wholly apart from the question of whether the adoption by the Commission of an incompatible color television system was contrary to law, are the following:

(1) Whether the Commission was authorized to prevent competition in broadcasting where no interference by one broadcaster with the signals of another is involved;** and

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* With regard to the Report of the Condon Committee and the RCA Progress Report, appellees stated in their Motion to Affirm (p. 21) that

> "Were the reports to be given consideration as a basis for modified findings and conclusions, conformity with the prior course of the proceedings and fairness to the parties would have required that the record be reopened for the introduction of these reports as evidence subject to cross-examination by the other parties."

If fairness to the parties required that an opportunity for cross-examination be afforded with respect to the Reports, that is precisely what the Commission should have given.

** The Commission is not justified in saying that, unless standards are first set by the Commission, each broadcaster could transmit whatever type of signal he chose

> "regardless of its interfering effect on other broadcasters . . ." (Motion to Affirm, p. 3).

The fundamental purpose of the Communications Act of 1934 and of its predecessor, the Radio Act of 1927, was to confer upon the Commission authority to prevent just such interference by one broadcaster with the signals of another. The Commission clearly has such authority—before or after the adoption of commercial standards.

This case does not present that problem at all. It presents, in fact, just the converse. It involves for the first time the question whether the Commission has the authority to rule out color signals which do *not* interfere with the signals of other broadcasters, which *can* be received on all existing sets, and which do not hurt anyone.

(2) Whether such action can be sustained where there is a total lack of administrative findings to support it.

Both of these questions are substantial.

Limitation on Competition.

The general policy of the Communications Act of 1934, in so far as it relates to broadcasting, is one of competition. The decisions of this Court emphasize the obligation of the Commission to promote competition in broadcasting.

Nevertheless, the action of the Commission prohibits the broadcast of compatible color signals—those which can be received in black and white on the nearly 12,000,000 black and white sets now in the hands of the public—and permits only the broadcast of incompatible color signals—those which cannot be received on existing television sets.

The Motion to Affirm (p. 3) concedes that the effect of the order is to provide that if the broadcaster should choose to broadcast color television, the signals transmitted must conform to the standards adopted by the Commission. These standards have been written for the incompatible CBS system only.

As is thus apparent, the order prohibits the broadcasting of television signals in accordance with the RCA compatible system, although the Commission has found that these signals can be received on the 12,000,000 black and white receivers in the hands of the public as black and white pictures, without the owners so much as touching their receivers.

The Commission has also found that the broadcasting of RCA color would not create electrical interference by one broadcaster with another.

The Commission's Reports and order clearly contemplate that television signals transmitted pursuant to the CBS system will be reproduced on some receivers as color pictures and on other receivers as black and white pictures. But the order prohibits the addition of technical character-

istics to the existing television signals which would make possible the reproduction of those signals in color as well as in black and white.*

As a result, the present system of black and white must face competition with CBS black and white. But CBS color is immunized from competition with compatible color.

This limitation on competition was imposed in spite of the clear and uncontradicted fact, testified to by the CBS Vice President and Chief Engineer, Dr. Goldmark, that the adoption of compatible color television standards would hurt nobody.

Dr. Goldmark, testifying for CBS, the sole proponent of an incompatible system, stated:

> "There is one non-compatible system. . . . There are two compatible systems . . . I couldn't sit here and tell you not to adopt standards of any of those systems because they don't have that device because nobody would get hurt by it if you do. *They are compatible.*" (Tr. 6546)

The Communications Act gives the Commission no power thus to suppress competition. On the contrary, the policy of that Act, in so far as it relates to broadcasting, is to encourage competition.

This case presents for the first time the question of whether the Commission has the legal power thus to suppress competition.

For the first time in the administrative practice of the Commission it has adopted the theory of permitting some competition among transmitting systems within the same broadcast band while suppressing other competition among those systems. No judicial determination by this Court nor any other court supports this assertion of authority by the Commission to limit competition.

The general policies of the Communications Act in respect of competition in the broadcasting field were stated

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* This is what the RCA system does. It adds technical characteristics to the standard television signal, enabling receivers designed to use those extra characteristics to produce color pictures.

by this Court in *Federal Communications Commission* v. *Sanders Brothers Radio Station*, 309 U. S. 470 (1940):

> "... the [Communications] Act recognizes that the field of broadcasting is one of free competition. The sections dealing with broadcasting demonstrate that Congress has not ... abandoned the principle of free competition. ...
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> • • • • • •
>
> "Congress intended ... to permit a [broadcasting] licensee who was not interfering electrically with other broadcasters to survive or succumb according to his ability to make his programs attractive to the public." (pp. 474-75)

The majority of the District Court did not refer to the action of the Commission in restricting competition. Judge La Buy in dissenting, however, stated that:

> "To prohibit the broadcast of color in completely compatible systems, whether it is RCA or any other fully compatible system, is a bar to competition between compatible and incompatible color and is unreasonable and arbitrary." (Statement as to Jurisdiction, p. 44)

Absence of Required Findings.

The Commission made no findings on the question of refusing to permit broadcasting of the compatible RCA system in competition with the incompatible CBS system.

On the contrary, the Commission has found that the broadcasting of RCA color would not, in the language of the *Sanders* case, create electrical interference by one broadcaster with another.* There is no finding by the Commission, contested or otherwise, that the commercial broadcasting of the RCA compatible television system should not also be authorized together with the incompatible system.

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* The interference referred to in the Commission's findings as applicable to the RCA color system was alleged interference *to* RCA color receivers caused by other electronic devices. Whether or not this may serve as a basis for action by the Commission to deal with interference caused by those devices, it does not furnish a basis for the rejection of a system whose broadcast transmissions do not interfere with the transmissions of other broadcasters.

During the hearings there was substantial questioning and testimony with respect to the possibility of permitting free competition between the CBS and RCA color systems and thus permitting the public to choose. Brigadier General David Sarnoff, Chairman of the Board of RCA, recommended that if the Commission should adopt standards for an incompatible system, it should permit the broadcasting of compatible systems as well. He urged that the standards set by the Commission be broad enough to permit any color television systems which met the basic requirements of compatibility, definition equal to the present high quality television standards, and transmission within a 6-megacycle channel.

So far as appears from the Commission's First and Second Reports, however, the Commission did not even consider whether there was any middle ground between the exclusive adoption of an incompatible system and the exclusive adoption of a compatible system. The Reports do not show that the Commission considered the possibility or advisability of permitting the broadcasting of compatible color together with the broadcasting of incompatible color.

It is apparent, therefore, that reversal of the District Court's judgment is required by the decision of this Court in *Jacob Siegel Co.* v. *Federal Trade Commission*, 327 U. S. 608 (1946). In that case, this Court held that it should not consider whether the complete prohibition there imposed by the Federal Trade Commission was warranted, since the Commission had not considered whether alternatives were possible:

> "But in the present case, we do not reach the question whether the Commission would be warranted in holding that no qualifying language would eliminate the deception which it found lurking in the word Alpacuna. For the Commission seems not to have considered whether in that way the ends of the Act could be satisfied and the trade name at the same time saved. We find no indication that the Commission considered the possibility of such an accommodation. It indicated that prohibition of the use of the name was in the public interest since the cease

> and desist order prohibited the further use of the name. But we are left in the dark whether some change of name short of excision would in the judgment of the Commission be adequate. . . . Its expert opinion is entitled to great weight in the reviewing courts. But the courts are not ready to pass on the question whether the limits of discretion have been exceeded in the choice of the remedy until the administrative determination is first made." (327 U. S. at pp. 613-14)

The instant case is *a fortiori* under the *Siegel* case. Whether this Commission has the power to suppress scientific development is certainly one of the substantial questions presented to this Court. If the Commission does have that power, it is one to be exercised with the greatest restraint and only if no other reasonable alternative is available, since it involves the priceless national resource of invention and research. Here the alternative was to permit compatible color to prove its worth in the arena of public choice—an alternative that is not even discussed in the First and Second Reports.

Appellees contend in their Motion that the Commission's limitation on competition is justified on the ground that permitting more than one system of color "would be complex and confusing, and would result in the purchase either of unduly complicated and as yet undeveloped receivers, or of receivers which could receive only some of the color broadcasts and not others." (Motion to Affirm, p. 19)

This argument of "confusion" is the classic one always advanced against competition.*

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* This argument is to be compared with the statement of the Commission in its Second Report, welcoming the idea of competition as between color receivers and black and white receivers:

> "In any event, if both types of receivers are offered to the public, *it will be the free forces of competition which govern whether a customer will buy* a color receiver or a black and white receiver." (¶12)

This Court cannot be asked to believe that competition between incompatible color and black and white should be encouraged but that the addition of a compatible color system to the range of free public choice would be intolerably confusing.

Moreover, no such findings of confusion and complexity were made by the Commission. Arguments of counsel are thus sought to be made a substitute for the lack of findings of an administrative agency. As this Court held in rejecting a similar effort in *Securities and Exchange Commission* v. *Chenery Corp.*, 318 U. S. 80 (1943):

> "But the difficulty remains that the considerations urged here in support of the Commission's order were not those upon which its action was based." (p. 92)

The foregoing rule that administrative action is legally valid only if it is based on *findings* has been consistently applied by this Court. *Jacob Siegel Co.* v. *Federal Trade Commission*, 327 U. S. 608 (1946); *Ashbacker Radio Corp.* v. *Federal Communications Commission*, 326 U. S. 327, 333 (1945); *Colorado-Wyoming Gas Co.* v. *Federal Power Commission*, 324 U. S. 626, 634 (1945); *Eastern-Central Ass'n* v. *United States*, 321 U. S. 194, 208-12 (1944); *Securities and Exchange Commission* v. *Chenery Corp.*, 318 U. S. 80, 92-94 (1943), 332 U. S. 194, 196-97 (1947); *United States* v. *Carolina Freight Carriers Corp.*, 315 U. S. 475, 488-89 (1942); *Phelps Dodge Corp.* v. *National Labor Relations Board*, 313 U. S. 177, 196-97 (1941); *National Labor Relations Board* v. *Fansteel Corp.*, 306 U. S. 240, 261 (1939); *Thomas Paper Stock Co.* v. *Porter*, 328 U. S. 50, 53 (1946); *Yonkers* v. *United States*, 320 U. S. 685, 691-92 (1944); *United States* v. *Chicago, M., St. P. & P. R.R.*, 294 U. S. 499, 510-11 (1935); *United States* v. *Baltimore & Ohio R. R.*, 293 U. S. 454, 463-65 (1935); *Panama Refining Co.* v. *Ryan*, 293 U. S. 388, 431-33 (1935).

The appellees contend that the Commission's refusal to permit the broadcasting of RCA compatible color in competition with CBS incompatible color is supported by their argument that the Commission should not "encourage the public to purchase RCA color receivers which cannot produce satisfactory color pictures . . . ." (Motion to Affirm, p. 19)

This is another argument of counsel which cannot be substituted for findings. In addition, any finding with respect to the quality of RCA color pictures is not directed to whether competition between compatible color and incompatible color should be permitted, since the Commission's Reports do not show that this question was considered.

Furthermore, the language of the Communications Act and its legislative history as well establish that the Commission has no jurisdiction to say what kind of television receivers shall be manufactured nor what kind of television receivers the public shall buy. The Act leaves that to competition.

From the standpoint of television receivers, no finding could therefore be made which would provide a lawful basis for an exercise of power by the Commission prohibiting competition between compatible and incompatible color.

D. The Errors of the District Court.

The substantial question relating to the right of appellants to a judicial review of the Commission's order is avoided entirely by appellees in their Motion. Nowhere is there any reference to the question set forth in appellants' Statement as to Jurisdiction as follows (pp. 9-10):

> "Whether the District Court erred in failing to rule on many determinative issues of law and fact (including the issue of whether the Commission's Order was supported by substantial evidence), the decision of which is essential to the proper disposition of the appeal, and in referring the decision of such issues to the Supreme Court, stating that it could not see 'why we should devote the time and energy which the importance of the case merits, realizing as we must that the controversy can only be finally terminated by a decision of the Supreme Court.'"

The majority of the District Court left important issues of the case unresolved.

An analysis of the opinion of the majority of the District Court shows this to be true. In addition, the express language of the District Court shows that it intended to leave the decision of the case on the merits to this Court.

Thus, the majority of the District Court stated (Statement as to Jurisdiction, p. 29):

> ". . . we have been unable to free our minds of the question as to why we should devote the time and energy which the importance of the case merits, realizing as we must that the controversy can only be finally terminated by a decision of the Supreme Court. This is so because any decision we make is appealable to that court as a matter of right and we were informed during oral argument, in no uncertain terms, that which otherwise might be expected, that is, that the aggrieved party or parties will immediately appeal. In other words, this is little more than a practice session where the parties prepare and test their ammunition for the big battle ahead."

In addition, in giving the basis for its order dismissing the complaint and allowing defendants' motion for summary judgment, the majority of that court said (*Id.* at p. 38):

> "Thus, as we evaluate the situation, there are two courses open, (1) to allow defendants' motion for a summary judgment, and (2) to vacate the order and send the proceeding back to the Commission for further consideration in view of recent developments in the color television field as well as the rapidly changing economic situation. A pursuance of the latter course, assuming we have such authority, of which there may be doubt, would inevitably result in the prolongation of the controversy which badly needs the finality of decision which can be made only by the Supreme Court. In other words, the interests of all, so we think, will be better served with this controversy on its way up rather than back from whence it comes."

For all practical purposes, appellants have not been given their day in court. If this Court should grant ap-

pellees' Motion to Affirm, appellants would, in effect, be deprived of judicial review.

This presents a substantial question for decision by this Court. Compare *Federal Communications Commission* v. *WJR, The Goodwill Station, Inc.*, 337 U. S. 265, 285 (1949); *Lutcher & Moore Lumber Co.* v. *Knight*, 217 U. S. 257 (1910); *Ex parte In the Matter of Harley-Davidson Motor Co.*, 259 U. S. 414 (1922); and *Oklahoma Natural Gas Co.* v. *Russell*, 261 U. S. 290 (1933); see also *William Cramp & Sons Ship and Engine Building Co.* v. *International Curtiss Marine Turbine Co.*, 228 U. S. 645, 648-49 (1913).

The action of the District Court in failing to make determinations on many of the issues presented to it is sufficient to give rise to substantial questions for this Court to decide, and to preclude the granting of the Motion to Affirm.

Nor is extended discussion necessary with respect to the ruling of the District Court as to evidence not considered by the Commission.

Certain of the evidence submitted to the Commission, and disregarded by the Commission, was submitted to the District Court for the purpose of obtaining the District Court's decision as to whether such evidence was rightly or wrongly disregarded by the Commission. This the District Court refused to consider on the ground that it did not have power to consider such evidence even in order to decide whether the Commission's disregard was proper (Statement as to Jurisdiction, pp. 37-38).

An important question is therefore presented to this Court, namely, whether there is or is not a remedy for the unlawful refusal of an administrative agency to consider admittedly relevant evidence accruing and presented well before the administrative decision is made.

Surely the District Court was in error in concluding that it could not consider such evidence for the purpose of determining whether such evidence should have been considered by the Commission.

Either the District Court is wrong on this issue, and must be reversed, or the issue must be determined by this Court. The far-reaching consequences of the decision on this point are clear.

E. No Administrative Agency Should Rely on an Interested Staff Member.

Appellees have argued in their Motion that this Court should not consider the issues arising from the role played in the administrative proceedings by a Commission staff engineer who had an interest in the adoption of the CBS system (Motion to Affirm, p. 26). Appellants believe that, in view of the scientifically complex matters with which government is becoming increasingly concerned, the necessity of dealing with such matters through administrative agencies, and the necessity of reliance by these agencies on members of their technical staff, these issues deserve this Court's most careful consideration.

The facts set forth in appellants' complaint and affidavits and not denied in any of the appellees' affidavits, motions or briefs are:

1. The Commission staff engineer, Chapin, took a most active role throughout the hearings and was in charge of the Commission's laboratory which tested the color systems. He had an interest of professional prestige and reputation in the adoption of the CBS system although no financial interest remained, and supported the CBS system throughout the hearings. He was the only witness other than CBS witnesses who supported an incompatible system.

2. In weighing the highly technical issues before it, the Commission relied upon this engineer's advice.*

* Only two of the seven members of the Commission have had technical training, and one of the two (the former Chief Engineer of the Commission) dissented from the adoption of the order. The rest are laymen.

3. This engineer advised the Commission in the absence of the proponents of color systems and participated in the formulation and preparation of the order and Reports of the Commission which are under review.

In their Motion, appellees have not argued that it was proper for the Commission to allow Chapin to participate as he did. Instead, their argument is that the impropriety of the Commission's action does not present a substantial question; first, because the objection by appellants when Chapin's interest became known was not properly phrased, and second, because it is not shown that the Commissioners were themselves biased.

Appellants submit that the objection made by RCA did raise for the Commission's consideration the question whether Chapin should be allowed to continue in the proceedings. The Commission's obligation to the public to avoid bias on the part of its staff is not a contingent one which becomes fixed only if certain magic words are spoken. The Commission's attention was directed to the point. This was enough.

So also with the argument that appellants have not shown that the Commissioners were themselves biased. As is true of many agencies dealing with complex scientific and technical problems, the majority of the members of this Commission are laymen. When passing on such problems, the technical findings which such an agency makes necessarily depend on the technical advice which it gets. The public has a right to expect that those members of its staff who are permitted to participate in the decision-making process will be free from personal interest in the Commission's decision.

When this is not true, it should be unnecessary to show actual bias on the part of the Commission. The danger of wrong is so great that it is the danger itself which should not be tolerated.

Conclusion.

Appellants respectfully submit that the Motion to Affirm should be denied in all respects. Because of the substantial issues presented, and because of the great public interest involved, this appeal should be fully briefed and fully argued. Compare *National Broadcasting Company* v. *United States*, 319 U. S. 190 (1943); *Insurance Group Committee* v. *Denver & Rio Grande Western R. R.*, 329 U. S. 607 (1947); *American Power & Light Co.* v. *Securities and Exchange Commission*, 329 U. S. 90 (1946); *St. Louis, Kansas City and Colorado R. R.* v. *Wabash R. R.*, 217 U. S. 247 (1910); *Civil Aeronautics Board* v. *State Airlines, Inc.*, 338 U. S. 572 (1950); *Ashbacker Radio Corp.* v. *Federal Communications Commission*, 326 U. S. 327 (1945); and *Patterson* v. *Lamb*, 329 U. S. 539 (1947).

Respectfully submitted,

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February 26, 1951.

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Supreme Court of the United States

OCTOBER TERM, 1950

No. 565

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., RCA VICTOR DISTRIBUTING CORPORATION, *et al.*,

Appellants,

against

UNITED STATES OF AMERICA, FEDERAL COMMUNICATIONS COMMISSION, AND COLUMBIA BROADCASTING SYSTEM, INC.,

Appellees.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES FOR THE NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION

REPLY OF APPELLANT EMERSON RADIO AND PHONOGRAPH CORPORATION TO MOTION TO AFFIRM.

SIMON H. RIFKIND,
Attorney for Appellant Emerson Radio and Phonograph Corporation

Of Counsel:
PAUL, WEISS, RIFKIND, WHARTON AND GARRISON.

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REPLY OF APPELLANT EMERSON RADIO AND PHONOGRAPH CORPORATION TO MOTION TO AFFIRM.

Appellant Emerson Radio and Phonograph Corporation herewith submits its Reply to the Motion to Affirm filed by the United States of America, the Federal Communications Commission and the Columbia Broadcasting System, Inc., appellees herein.

Appellees' Motion suggests that this Court affirm, *without argument*, the summary judgment of the three-judge District Court which, with one judge dissenting, denied a

permanent injunction restraining enforcement of the FCC order here under review; the challenged FCC order provides for the adoption of CBS standards for the transmission of color television, to the exclusion of the standards—compatible with existing black-and-white television transmission standards—proposed by the Radio Corporation of America.

Appellees' Motion also suggests—by way of footnote and with a degree of diffidence whose wider use might have lent charm to appellees' prayer for summary affirmance—that the appellants, including Emerson, the instant appellant, and excepting only RCA, are without standing to appeal to this Court.

This Reply will address itself in turn to each of appellees' twin suggestions:

1. The Suggestion That This Court Summarily Affirm

The challenged order of the FCC is not a routine order subject to ready correction as time reveals its error. This order may irrevocably congeal the character of television for generations to come. Once the system contemplated by the order is established, it can no more readily be changed than the gauge of United States railway trackage. A commission possessed of a modicum of respect for the opinion of others, or exhibiting the normal humility of any finite mind which entertains the philosophical question whether it might be wrong, would not obstruct, but would indeed solicit the most careful review of its judgment in order to afford the country the maximum degree of assurance that its decision is free of detectible error. It is frightening to observe in the FCC such stout resistance

to the reexamination of its oracular edict—a resistance exhibited in the court below by the FCC's refusal to consent to a stay of its order while that court deliberated upon the issues; a resistance exhibited here by the making of this motion for summary affirmance. Congressional policy as reflected in the Administrative Procedure Act and in the debates which led to its enactment is designed to put a tight curb upon claims to administrative omniscience rather than to give those claims the free rein sought by the FCC.

This Court has had prior occasion to examine the "provisions for judicial review in the [Communications] Act of 1934 * * * Section 402(a) makes the provisions of the Urgent Deficiencies Act of October 22, 1913 . . . pertaining to judicial review of orders of the Interstate Commerce Commission, applicable to 'suits to enforce, enjoin, set aside, annul, or suspend any order of the [Federal Communications] Commission under this Act . . .' * * * The Urgent Deficiencies Act, which is thus incorporated in § 402(a) of the Communications Act of 1934, provides for review in a specially constituted district court, with direct appeal to this Court." *Scripps-Howard Radio* v. *Federal Communications Commission,* 316 U. S. 4, 7.

Relying on the quoted language, and on the decisions of this Court in *Columbia Broadcasting System, Inc.* v. *United States,* 316 U. S. 407 and *National Broadcasting Company* v. *United States,* 319 U. S. 190, appellants sought review of the challenged FCC order in a three-judge United States District Court. That court took jurisdiction of the cause. That court recognized the substantial character of appellants' challenges to the order: the court evidenced this recognition in the fact that it restrained enforcement of the order pending decision; in the fact that after decision

it continued the temporary restraint pending appeal to this Court; in the fact that its stated alternative to summary judgment for appellees was "to vacate the order and send the proceeding back to the Commission for further consideration . . .," and that the court rejected the latter course only because of its conviction that "the interests of all . . . will be better served with this controversy on its way up rather than back from whence it comes"; and in the fact that one member of the court dissented with vigor from the denial of a permanent injunction.

But the District Court, although it observed the rituals of judgment, withheld the substance of the decisive safeguard against administrative excess—the safeguard guaranteed by statute and by the quoted language of this Court—"judicial review". The District Court was in a sense overwhelmed by its discovery that the widespread legal and and public importance of the issues raised by appellants rendered this a "controversy which badly needs the finality of decision which can be made only by the Supreme Court." For the District Court, believing on heretofore good authority that "any decision we make is appealable to [the Supreme Court] as a matter of right," sloughed off its robes of office to view in tranquility what it chose to regard as "little more than a practice session where the parties prepare and test their ammunition for the big battle ahead.". Resolute to unravel the last faded remnant of its authority, the District Court completed its own abdication and its careful frustration of the statutory scheme by shifting to this Court the District Court's primary and prescribed responsibility for the judicial review of administrative action. With notable candor, the District Court announced that "in studying the case, we have been unable to free our minds of the ques-

tion as to why we should devote the time and energy which the importance of the case merits, realizing as we must that the controversy can only be finally terminated by a decision of the Supreme Court."

Consonant with its forthright policy of indecision, the District Court failed to resolve the following substantial questions which (together with other questions presented with greater particularity in appellants' Statement as to Jurisdiction and in the joint RCA-NBC-RCA Victor Reply to Motion to Affirm) now confront this Court virtually as problems of first instance:

(1) *Whether substantial evidence supported the FCC's adoption of the CBS color television transmission standards.* (The District Court's premise for avoidance of this issue—its statement that "While the findings of the Commission are severely criticized, it is not contended in the main that they are not supported by substantial evidence"—is undermined by appellees' admission in their Motion to Affirm that appellants "urged in the Court below, and urge here, that there was no substantial supporting evidence . . .").

(2) *Whether, assuming* arguendo *that the FCC had a substantial evidentiary basis for adopting CBS color, the FCC had any warrant either in the record before it and the findings and conclusions made thereon or in the Communications Act for its extraordinary action in conferring a color television monopoly on CBS by barring the concurrent adoption of the compatible RCA standards.* It is submitted that nothing in the FCC's findings and conclusions, and nothing in the evidence before the FCC, demonstrates that the FCC considered, and found adequate reason for rejecting, the simultaneous adoption of the RCA standards.

Appellees' conjectural justifications for the exclusive adoption of one set of standards seem unpersuasive at best, in view of the clear Congressional mandate that "the field of broadcasting is one of free competition." *Federal Communications Commission* v. *Sanders Brothers Radio Station*, 309 U. S. 470, 474. See *National Broadcasting Company* v. *United States*, 319 U. S. 190; cf. 47 U. S. C. §§ 311, 313, 314. But appellees' retrospective itemization of possible benefits derived through suppression of competition is in any event irrelevant: the FCC's order must be tested against the record before the FCC *and the findings and conclusions which the FCC based upon that record.* "Its action must be measured by what the Commission did, not by what it might have done * * * The Commission's action cannot be upheld merely because findings might have been made and considerations disclosed which would justify its order as an appropriate safeguard for the interests protected by the Act. There must be such a responsible finding * * * There is no such finding here." *Securities and Exchange Commission* v. *Chenery Corporation*, 318 U. S. 80, 93-94. It is further submitted that the FCC was in any event without jurisdiction to bar the RCA standards, for it is not questioned that the RCA standards yield completely satisfactory black-and-white pictures on existing receivers, and the Commission is only empowered to regulate "the kind of apparatus to be used with respect to its external effects and the purity and sharpness of the emissions from each station and from the apparatus therein." 47 U. S. C. § 303(e). The fact that these black-and-white pictures can be converted into color at the option of the viewer (by an alteration of his receiver set) is of no legitimate concern to the FCC, which concededly is without jurisdiction over the manufacture of receiving apparatus.

(3) *Whether the FCC acted arbitrarily and without due regard for the public interest in not concluding that the art of color television was not sufficiently advanced to justify the final adoption of any of the proposed color television transmission standards.*

(4) *Whether the FCC order is void in that it was expressly premised on the non-compliance by television set manufacturers and television broadcasters with two conditions which the FCC was wholly without authority to impose.* The FCC order adopting CBS color (announced in the FCC's Second Report) was the product not of administrative decision but of administrative frustration. For in the FCC's First Report the FCC concluded that its preferred course of action would be to postpone final adoption of CBS color pending the acquisition of further information on the rapid technical advances being made. However, assertedly to avoid aggravation of the problem of compatibility (through continued proliferation by set manufacturers of the existing type of television receiver which cannot, without expense alterations, receive CBS color transmissions either in color or in black-and-white), the FCC conditioned postponement of a final order adopting CBS color as follows: (1) first, the proposed postponement was expressly conditioned on broadcasters' acceptance "without a hearing" of alteration of existing black-and-white transmission standards to include the so-called "bracket standards" capable of transmitting CBS color for receipt in monochrome on appropriately adapted receiving sets; (2) second, the proposal was further expressly conditioned on commitments from the set manufacturing industry to "build all their television receivers so as to be capable of operating within the above brackets." The first condi-

tion, in attempting the alteration without a hearing of long-prevailing engineering standards, clearly violated elementary procedural limitations binding on the FCC, since the FCC "must conform to the Administrative Procedure Act which prescribes uniform rule-making practices for Federal agencies to follow." *Sixteenth Annual Report, Federal Communications Commission*, p. 14. The second condition, in attempting to assert authority over television set manufacturers (including appellant Emerson), exceeded the substantive powers of the FCC, since that agency "does not license . . . receiving sets . . . nor does it regulate their manufacture or sale." *Sixteenth Annual Report, Federal Communications Commission*, p. 101. Nevertheless, when set manufacturers proved both unable (within the allotted time) and unwilling to comply with the FCC's purported exercise of dominion over them, the FCC made good its threat by forthwith ordering the exclusive adoption of the CBS color standards. Thus, even if it be assumed that the FCC order is otherwise unassailable, the fact that the order was premised on an abortive exercise of power which the FCC does not possess vitiates the order, for "an administrative order cannot be upheld unless the grounds upon which the agency acted in exercising its powers were those upon which its action can be sustained." *Securities and Exchange Commission* v. *Chenery Corporation*, 318 U. S. 80, 95.

Appellants, having raised many questions and having received few answers in the "practice session" conducted by the District Court, have come to this Court as of right. Here appellants are met by a motion for summary affirmance of the judgment below—a motion buttressed by the bland assertion that "it is evident that no substantial ques-

tion of fact or law is raised by this appeal." It is submitted that each of the questions outlined above (and each of the many questions presented in the Statement as to Jurisdiction and in the joint RCA-NBC-RCA Victor Reply) is "substantial" and is entitled to full argument and briefing before this Court.

Moreover, it is submitted that, because of the peculiar history of this cause in the District Court, the substantial errors conventionally assigned on appeal are here underlined by a more penetrating error which is decisive against appellees' motion for summary affirmance. That error, which is unrelated to the legal merits of the judgment of dismissal below, is the failure of the lower court to accord appellants the "judicial review" which is their due. For Congress has established an administrative agency upon which it has conferred large and yet carefully delineated powers over great segments of the communications industry. "Congress has also provided for judicial review as an additional assurance that its policies be executed." *United States* v. *Carolina Freight Carriers Corporation*, 315 U. S. 475, 489. Congress has indeed gone further and has taken occasion to define, in accordance with settled Anglo-American legal principles, the character of the "judicial review" to which "[a]ny person suffering legal wrong because of any agency action shall be entitled . . ." 5 U. S. C. A. § 1009(a). "So far as necessary to decision and where presented the reviewing court shall decide all relevant questions of law, interpret constitutional and statutory provisions, and determine the meaning or applicability of the terms of any agency action. It shall . . . hold unlawful and set aside agency action, findings, and conclusions found to be . . . arbitrary, capricious, an abuse

of discretion, or otherwise not in accordance with law . . . in excess of statutory jurisdiction, authority, or limitation, or short of statutory right . . . without observance of procedure required by law . . . unsupported by substantial evidence. . . ." 5 U. S. C. A. § 1009(e).

It is submitted that the "judicial review" described above has thus far eluded appellants. They have not yet had their day in court.

2. The Suggestion That Emerson Has No Standing To Appeal

Emerson, a manufacturer of television receiving sets, petitioned the FCC for permission to intervene in and give testimony at the FCC hearings on color television which were the basis for the FCC order here under review. This petition was denied.

At the institution of the instant suit, Emerson, over the objection of appellees, petitioned for and was granted permission to intervene as a party plaintiff.

After the District Court's dismissal of the complaints herein, Emerson joined with the other parties plaintiff and perfected the instant appeal.

The appellate status of Emerson, as well as that of the other appellants in the instant action, rests on 28 U. S. C. § 1253:

> "Except as otherwise provided by law, any party may appeal to the Supreme Court from an order granting or denying, after notice and hearing, an interlocutory or permanent injunction in any civil action, suit or proceeding required by any Act of Congress to be heard and determined by a district court of three judges."

Emerson is of course a party plaintiff of record, and accordingly is a proper party appellant within the letter of the relevant statute.

But, presumably by way of collateral attack on Emerson's appellate standing, appellees repeat the contention that the District Court erred in permitting Emerson to intervene as a party plaintiff. In view of the express provisions of 28 U. S. C. § 2323 (derived, like 28 U. S. C. § 1253, *supra*, from the Urgent Deficiencies Act), it would seem clear that Emerson was properly granted intervention as a party plaintiff:

> "... any party or parties in interest to the proceeding before the Commission, in which an order or requirement is made, may appear as parties of their own motion and as of right, and be represented by their counsel, in any action involving the validity of such order or requirement or any part thereof, and the interest of such party.
>
> "Communities, associations, corporations, firms, and individuals interested in the controversy or question before the Commission, or in any action commenced under the aforesaid sections may intervene in said action at any time after commencement thereof."

The foregoing language does not merely make frivolous any contention that the lower court abused its discretion if it allowed Emerson to intervene as a permissive intervenor. See Rule 24 of the Federal Rules of Civil Procedure. On the contrary, the first quoted sentence of § 2323 compels the conclusion that the lower court quite properly regarded Emerson as an intervenor as of right on the ground that the FCC had erred in excluding Emerson from participation in the administrative proceedings. Emerson, as a set manu-

facturer, sought to intervene in the FCC hearings to testify against certain proposed color television transmission standards on the basis of which its "competitive advantage was threatened. Having this interest, [it was] entitled to intervene in that administrative proceeding. And if [it] did so, [it] became entitled under § 212 of the Judicial Code [present 28 U. S. C. § 2323] to intervene, as of right, in any suit 'wherein is involved the validity' of the order entered by the Commission." *Alexander Sprunt* v. *United States*, 281 U. S. 249, 254-255. The fact that the FCC refused to recognize Emerson's right to participate in the FCC hearings could not operate to deny Emerson future standing to intervene as of right as a party plaintiff in opposition to the FCC order, for denial of an absolute right of intervention is remediable by and itself confers standing to appeal. *Brotherhood of Railroad Trainmen* v. *Baltimore & Ohio R. Co.*, 331 U S. 519. In any event, whether Emerson be viewed as a permissive intervenor or as an intervenor as of right, Emerson was on either basis a proper party plaintiff in the lower court and is accordingly a proper party appellant here. As this Court noted in careful scrutiny of the Urgent Deficiencies Act (whose successor statutes form the basis of the present appeal), "Other sections permit . . . complainants before the Commission, or any party in interest in a proceeding before that body, or any other interested party, to become parties to a suit involving the validity of an order of the Commission . . . and accord to any aggrieved party the right of appeal to this Court." *Interstate Commerce Commission* v. *Oregon-Washington R. & Nav. Co.*, 288 U. S. 14, 23-24.

Nor is any of the cases cited by appellees authority for a denial of appellate standing to Emerson or to any of the

other appellants. The cases relied on as authority for dismissal of the appeal (as to every appellant but RCA) are, for the most part, variants of the classic rule of *Massachusetts* v. *Mellon*, 262 U. S. 447, denying the existence in the private citizen of an inherent common-law right to challenge Government conduct; the applicability of these cases to a specific statutory scheme for judicial review of administrative action is not readily apparent. The single relevant case cited by appellees is *Alexander Sprunt* v. *United States*, 281 U. S. 249. But that case is support for rather than repudiation of the standing to appeal of Emerson and the rest of the challenged appellants. For Justice Brandeis there held for this Court that an intervenor in a three-judge court action who was without standing to initiate the action independently had no standing to appeal from dismissal of the cause *where the principal plaintiff failed to appeal*. *Cf. Interstate Commerce Commission* v. *Oregon-Washington R. & Nav. Co.*, 288 U. S. 14. A similar rule bars the intervenor with no independent interest to assert, from appealing *independently* of the principal plaintiff. *Boston Towboat Co.* v. *United States*, 329 U. S. 632. In the instant case, however, the principal plaintiff—RCA—is appealing, and appellees do not challenge RCA's manifest standing to appeal; accordingly, since the other appellants were proper parties plaintiff below and have joined with RCA in a single appeal in this Court, all the appellants are properly before this Court.

CONCLUSION

It is urged that the Motion to Affirm be overruled, and that the appeal be set down for argument before this Court.

Respectfully submitted,

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Supreme Court of the United States

OCTOBER TERM, 1950.

No. 565.

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., RCA VICTOR DISTRIBUTING CORPORATION, *et al.*,

Appellants,

against

UNITED STATES OF AMERICA, FEDERAL COMMUNICATIONS COMMISSION, and COLUMBIA BROADCASTING SYSTEM, INC.,

Appellees.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES FOR THE NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION.

BRIEF FOR APPELLANTS

RADIO CORPORATION OF AMERICA
NATIONAL BROADCASTING COMPANY, INC.
RCA VICTOR DISTRIBUTING CORPORATION

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March 19, 1951.

TABLE OF CONTENTS.

	PAGE
INTRODUCTION	1
OPINIONS BELOW	4
JURISDICTION	4
QUESTIONS PRESENTED	5
STATUTES INVOLVED	6
STATEMENT	6
The Existing Television Service	6
The Incompatible CBS System	9
The RCA Compatible Color Television System	12
Efforts of Others to Develop Compatible Color Systems	16
The Rejection of Compatible Standards	17
(a) Rejection of Expert Evidence	19
(b) The Refusal to Allow the Time Previously Recognized as Necessary for Development	20
(c) The Commission Alsc Has Ignored Wholly Independent Evidence	22
(d) The Commission's Reliance on Interested Staff Engineer	24
The Conditions Upon Which the Commission Said the Adoption of the CBS System Might Be Avoided	27
The Commission's Refusal to Consider New and Determinative Developments	28
The Proceedings Before the District Court	30
SPECIFICATION OF ERRORS	34
SUMMARY OF ARGUMENT	35

ARGUMENT: PAGE

POINT I. The Adoption of the Incompatible CBS Color Television Standards is Contrary to the Public Interest 41

A. "The Standard Gauge" 43

B. Efficiency and Room for Improvement 46

C. Encouragement of Research—Avoidance of Premature Standards 47

D. Violation of the Public Interest 50

POINT II. The Commission's Record is Concededly Inadequate and the Action of the Commission is Not Supported by Substantial Evidence 52

A. Admitted Inadequacy of Administrative Record 53

B. Lack of Substantial Evidence to Support the Commission's Findings 58

1. The CBS Color Television System 58

a. CBS Limitation on Picture Size 58

b. CBS Susceptibility to Flicker 61

c. CBS Picture Quality and System Equipment 64

d. CBS "Geometric Resolution" (Lack of Picture Detail) 67

2. The RCA Color Television System 69

a. RCA Color Fidelity 69

b. RCA Picture Texture 74

c. RCA Receiving Equipment 75

d. RCA Transmitting Equipment 79

e. RCA Alleged Susceptibility to Interference 80

f. RCA Network Transmission 81

g. RCA Field Testing 83

PAGE

C. The Record As a Whole Does Not Support the Criteria Chosen by the Commission..... 84

1. Compatibility 84

2. Resolution (Picture Detail)..... 89

3. Picture Size 94

4. Flicker—Brightness 95

5. Effectiveness of Channel Utilization.... 96

POINT III. The Ruling Out of Broadcasting of a Compatible System in Competition With an Incompatible System is Contrary to Law..... 97

A. The Limitation on Competition..... 98

B. The Question of the Commission's Authority 100

C. The Policy of Competition..... 101

D. Absence of Required Findings..... 103

E. Purported Justification of Limitation on Competition 106

1. The Alleged Color Performance of Receivers 107

2. The Asserted Authority to Control the Sale of Receiving Sets..... 109

3. The Argument of Confusion..... 110

F. Arguments of Counsel Cannot Supply a Lack of Findings..... 111

G. Faith in Free Public Choice..... 112

H. Power of the Court..... 113

POINT IV. The Commission Violated Its Duty Under the Communications Act and the Administrative Procedure Act to Inform Itself and to take Account of Determinative Facts..... 115

A. Obligation Under the Communications Act 115

PAGE

B. Material Disregarded Was of Controlling Significance 118

C. Attempted Justification of Refusal to Consider These Reports 120

D. Violation of Administrative Procedure Act 126

E. Illegal and Impossible Conditions Imposed by Commission on Considering Additional Data 128

POINT V. The Court Below Did Not Afford Appellants Proper Judicial Review 134

A. The Standard Of Judicial Review Applied By The Court Below Was Incorrect 134

B. District Court's Failure To Give Proper Judicial Review In Other Important Respects 138

C. Relevant Matter Presented To The Commission Not Properly Considered By Court Below 141

POINT VI. The Commission's Reliance Upon a Member of Its Engineering Staff Who Had an Interest in the Outcome Was Improper 142

CONCLUSION 145

APPENDIX A A-1

APPENDIX B B-1

Table of Authorities.

Cases.

PAGE

Addison v. *Holly Hill Fruit Products, Inc.*, 322 U. S. 607 115

American Telephone & Telegraph Co. v. *United States*, 299 U. S. 232 135

Ashbacker Radio Corp. v. *Federal Communications Commission*, 326 U. S. 327 ..... 37, 38, 112

Colorado-Wyoming Gas Co. v. *Federal Power Commission*, 324 U. S. 626 112

Columbia Broadcasting System, Inc. v. *United States*, 316 U. S. 407 114

Eastern-Central Association v. *United States*, 321 U. S. 194 112

Federal Communications Commission v. *Sanders Brothers Radio Station*, 309 U. S. 470 ..... 37, 101, 102, 103

Federal Communications Commission v. *WJR, The Goodwill Station, Inc.*, 337 U. S. 265 140

Federal Security Administrator v. *Quaker Oats Co.*, 318 U. S. 218 135

Ex Parte Harley Davidson Motor Co., 259 U. S. 414 140

Jacob Siegel Co. v. *Federal Trade Commission*, 327 U. S. 608 ..... 38, 104, 105, 112

Lutcher & Moore Lumber Co. v. *Knight*, 217 U. S. 257 140

National Broadcasting Company v. *United States*, 319 U. S. 190 ..... 41, 96, 103, 116, 125, 126, 135

National Labor Relations Board v. *Fansteel Corp.*, 306 U. S. 240 112

National Labor Relations Board v. *The Pittsburgh Steamship Co.*, 337 U. S. 656; 19 U. S. L. Week 4136 (U. S. Feb. 26, 1951) 36, 40, 53, 135, 138

Norwegian Nitrogen Products Co. v. *United States*, 288 U. S. 294 ..... 49, 50

Oklahoma Natural Gas Co. v. *Russell*, 261 U. S. 290 140

PAGE

Panama Refining Co. v. *Ryan*, 293 U. S. 388 112
Phelps Dodge Corp. v. *National Labor Relations Board*, 313 U. S. 177 112
Securities and Exchange Commission v. *Chenery Corp.*, 318 U. S. 80 ..... 111, 112
Scripps-Howard Radio, Inc. v. *Federal Communications Commission*, 316 U. S. 4 ..... 41, 42
Thomas Paper Stock Co. v. *Porter*, 328 U. S. 50 112
Touhy v. *Ragen and McSwain*, 19 U. S. L. Week 4151 (U. S. Feb. 26, 1951) 105
United States v. *American Trucking Associations*, 310 U. S. 534 50
United States v. *Associated Press*, 52 F. Supp. 362 (S. D. N. Y. 1943), *aff'd*, 326 U. S. 1 ..... 114, 115
United States v. *Baltimore & Ohio R.R.*, 293 U. S. 454 112
United States v. *Carolina Freight Carriers Corp.*, 315 U. S. 475 ..... 38, 112
United States v. *Chicago M. St. P. & P. R.R.*, 294 U. S. 499 112
United States v. *Yellow Cab Co.*, 338 U. S. 338 135
Universal Camera Corp. v. *National Labor Relations Board*, 19 U. S. L. Week 4160 (U. S. Feb. 26, 1951) 36, 39, 40, 53, 58, 135, 138
Yonkers v. *United States* 320 U. S. 685 112

STATUTES.

Administrative Procedure Act (60 Stat. 238, 243; 5 U. S. C. §1001 *et seq.*) 5, 38, 58, 126, 127, 135, 136, 139
Section 4 ..... 6, 39, 126, 128, A-3, A-4
Section 10 ..... 6, A-5, A-6
Communications Act of 1934 (48 Stat. 1082, 1093; 50 Stat. 197; 63 Stat. 108; 47 U. S. C. §151 *et seq.*) 5, 38, 44, 51, 54, 98, 100, 101, 102, 115, 126
Section 3(h) 6
Section 303(c) 6, A-1

PAGE

Section 303(e) 6, A-1
Section 303(f) 6, A-1
Section 303(g) 6, 24, 41, 42, 67, 116, A-1
Section 402(a) 6, 114, A-2

Judicial Code, Title 28 (62 Stat. 928, 931, 968, 970; 63 Stat. 105; 28 U. S. C. §§1253, 1336, 2101(b), 2284, 2323, 2325)

Section 1253 ..... 4, 6, A-2
Section 1336 ..... 6, A-2
Section 2101(b) 4
Section 2284 32
Section 2323 ..... 6, A-2, A-3
Section 2325 32

OTHER AUTHORITIES.

Bush, Science—The Endless Frontier (1945) 105

47 Code Fed. Regs. 118, 205, 245 (1949) 117

Davis, *Official Notice*, 62 Harv. L. Rev. 537 (1949) 125

In re Application of L. E. Duffey and B. C. Eddins d/b as The Voice of Cullman, Docket 9325, March 27, 1950 102

16 FCC Ann. Rep. 13 (1950) 127, 131

FCC, Report of the Commission in the Matter of Order No. 65 Setting Television Rules and Regulations for Further Hearing, Docket No. 5806 (May 28, 1940) 7, 42-45, 47, 48, 55, 90, 94, 100, 116

FCC, Report, Docket No. 5806 (May 3, 1941) 8, 24

PAGE

FCC, Report of the Commission in the Matter of Petition of Columbia Broadcasting System for Changes in Rules and Standards of Good Engineering Practice Concerning Television Broadcast Stations, Docket 7896, 11 F. C. C. 1523 (March 18, 1947) 13, 45, 47, 53, 55, 63, 64, 95

FCC Release No. 35013 91

Hearings before Subcommittee of the Committee on Appropriations on the Independent Offices Appropriation Bill for 1949, 80th Cong., 2d Sess., 1035 (1948) 21

Hearings before the Committee on Interstate and Foreign Commerce, U. S. Senate, 81st Cong., 1st. Sess., on the Nomination of E. M. Webster to the Federal Communications Commission 85

In re Applications of Lake Huron Broadcasting Co. (WKNX) and WKMH, Docket Nos. 9360 and 9568 (Dec. 8, 1950) 56

Landis, The Administrative Process, 1938 124

National Production Authority Regulation 1; 15 Fed. Reg. 6253 (September 19, 1950) 133

Pike and Fischer, 6 R. R. 164, 875 ..... 56, 102

Report of the Condon Committee, Sen. Doc. No. 197, 81st Cong., 2d Sess. (1950) ..... 22, 23, 24, 29, 39, 71, 89, 90, 96, 118, 119, 120, 122, 123, 125, 127, 128, 141, B-1 through B-6

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RADIO CORPORATION OF AMERICA
NATIONAL BROADCASTING COMPANY, INC.
RCA VICTOR DISTRIBUTING CORPORATION

Introduction.

In the last four years a new industry—the television industry—has come into existence and has developed to the point where 45,000,000 people now receive television program service costing $150,000,000 a year (R. 607-08).

The public investment in television home receivers now totals $3,000,000,000, representing some 12,000,000 television receivers.

The growth of television has been based upon the high-quality transmission standards for black and white tele-

vision which were recommended by the industry and were adopted by the Federal Communications Commission (hereinafter called the Commission) in 1941 (R. 569).

Under these standards every television transmission is receivable by every television receiver within its range (R. 563, 581).

Under the order here under review this will no longer be true.

The order of the Federal Communications Commission would put into commercial operation a system of television from whose transmissions none of the 12,000,000 sets now in the hands of the public would be able to receive any picture whatsoever (R. 147, 559, 575, 794, 876; Tr. 3411,* 4612, 4750-51, 4829, 4949, 5134, 6442, 6546, 9962, 10022).

The transmission standards adopted by the order for color television are incompatible with the existing standards adopted for black and white television. Thus, no program broadcast in accordance with the standards adopted by the order can be received on any existing receiver.

If a television program were to be broadcast in accordance with the color television standards adopted by the Commission, none of the more than 45,000,000 people who now comprise the television audience would be able to get that program in any form whatsoever. Those of the 45,000,000 people who are accustomed to looking at a particular program would be unable to see that program when it is broadcast in accordance with the transmission standards adopted by the order.

This is what the incompatibility of the new standards means.

---

* Reference is made in this manner to the transcript of testimony before the Commission. By order of this Court on March 5, 1951 leave was granted to dispense with the printing of this transcript.

Only after extensive and expensive adaptation could any of the existing 12,000,000 sets in the hands of the public receive any picture whatsoever from these incompatible color standards—and then only a degraded black and white picture having less than one-half the picture detail obtainable on the existing standards (R. 147-48, 575, 602, 794-95, 876; Tr. 2197, 3280, 3446, 3971, 4829, 4949, 5106, 9413-14, 9554, 10022-23). To get color under the standards fixed by the Commission, adaptation first is necessary and thereafter a converter must be added. This converter alone is twice as expensive as the adapter and does not increase the picture detail (R. 148-49, 575-76, 602, 876; Tr. 2671, 3687, 4863-64, 5328, 9134-39, 9154-64).

Nor does anyone maintain that all existing receivers, or anything approaching that number, will in fact be so adapted or converted. Indeed, the evidence is quite to the contrary (Tr. 4351-52, 5613).

Except for appellee Columbia Broadcasting System, Inc. (hereinafter called CBS)—the proponent of the incompatible system—the electronics industry, which created television and which has been responsible for its development, is agreed that a satisfactory compatible color system is attainable (Tr. 2529-30, 4864, 8185, 8199-8200, 8266-67, 8385-86, 9397, 9495). In a compatible color system the signals can be received on existing receivers as high-quality black and white pictures without so much as touching the receiver (R. 573, 580-81, 584, 879; Tr. 2664, 4857, 6051-53; Exhibits 203, p. 16*; 204; 206, pp. 1-2; 207, pp. 2, 16-17; 209, p. 10; 364; 365; 366; 367).

Again, except for CBS, not a single witness before the Commission testified that it was necessary or even desirable to adopt an incompatible color system in order to obtain color television.

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* Reference is made in this manner to the exhibits received in evidence during the administrative proceedings before the Commission.

The order of the Commission is not one which provides for a new and additional service on new and additional frequencies. Nor is it a mere licensing order affecting only a few applicants for a particular transmitting station in a single location.

The order would disrupt the whole basis of television service to the nation—as the adoption of a different gauge of railroad track would disrupt the nation's entire rail transport system—and with as little justification (R. 559, 580-81, 600, 608-11; Tr. 8184-86, 10093-95, 10101-02, 10529-30).

In addition, in authorizing the commercial broadcasting of an incompatible system, the Commission not only disregarded the almost unanimous position of industry experts, but it ruled out the broadcasting of compatible color in competition with incompatible color (R. 162-63, 432-34, 558, 580-81, 881; Motion to Affirm, p. 3).

This was done even though the uncontradicted evidence is that the broadcasting of compatible color would hurt no one (Tr. 6546, 8185).

Opinions Below.

The opinion of the District Court (R. 863-79) and the dissenting opinion of Judge La Buy (R. 879-81) are not yet reported.

Jurisdiction.

The orders of the District Court were entered on December 22, 1950 (R. 882) and January 23, 1951 (R. 883). A joint petition for direct appeal to this Court was filed January 25, 1951 (R. 884-85) and was allowed on January 25, 1951 (R. 892-93).

The jurisdiction of this Court is invoked under Sections 1253 and 2101(b) of Title 28 of the United States Code (28 U. S. C. §§1253 and 2101(b)). This Court noted probable jurisdiction on March 5, 1951.

Questions Presented.

The questions presented by this appeal are:

A. Whether the Commission acted in accordance with its statutory mandate to further the public interest and encourage the larger and more effective use of radio in the public interest when it adopted transmission standards for a television system which cannot be received at all by the existing 12,000,000 receivers in the hands of the public without extensive and expensive adaptation, and whether such action was arbitrary and capricious.

B. Whether the Commission acted in accordance with the general policy of the Communications Act of 1934 favoring competition in ruling out the broadcasting of a color television system that is admitted would hurt no one and which can be received on all the existing 12,000,000 receivers as black and white pictures without touching the receivers—particularly, where research and development is thus stifled, competition between competing color television systems is suppressed, and no findings have been made that competition between color systems for public acceptance should not be permitted.

C. Whether the Commission can lawfully enter an order

(1) upon a record which is concededly insufficient;

(2) which is not supported by substantial evidence;

(3) without adequately informing itself as to the facts upon which a legal order should rest although it was requested to do so;

(4) without complying with the Administrative Procedure Act;

(5) without having made the requisite findings necessary to support the order; and

(6) relying upon an interested staff engineer for determinative technical advice.

D. Whether the District Court erred in sending the case to this Court without having decided many determinative issues.

Statutes Involved.

The statutes pertinent to this appeal are annexed to this brief as Appendix A. They are Sections 303(c), (e), (f) and (g) and 402(a) of the Communications Act of 1934, as amended (48 Stat. 1082, 1093; 50 Stat. 197; 63 Stat. 108; 47 U. S. C. §§303(c), (e), (f), (g); 402(a); Sections 1253, 1336 and 2323 of the Judicial Code (62 Stat. 928, 931, 970; 63 Stat. 105; 28 U. S. C. §§1253, 1336, 2323); and Sections 4 and 10 of the Administrative Procedure Act (60 Stat. 238, 243; 5 U. S. C. §§1003, 1009).

Statement.

The Existing Television Service.

Television broadcasting standards for commercial service were first adopted by the Commission in 1941, after many years of research and development by the industry, extending as far back as the 1920's (R. 561-62, 569).*

The Commission did not adopt standards for the broadcasting of television in black and white until it was satisfied that those standards were of the highest quality obtainable in the state of the art then existing *and* left full scope for future development (R. 558-59, 562-69).

Nor was black and white television instituted on a commercial basis until the industry engineers were sub-

* The Act expressly provides that television broadcasting is *not* a common carrier service. Communications Act of 1934, as amended, Section 3(h).

stantially in accord that it was technically ready and were further in accord as to the standards upon which it should be based (R. 568-69).

The Commission recognized that the setting of basic standards was of great importance in determining the quality of the television broadcast service available to the public for the reason that such basic standards set the upper limits of performance which may be achieved by television transmitting and receiving equipment for the future as well as for the present (R. 559, 562-69; Tr. 7974-76, 7984, 8113, 9405, 9497).

The performance capabilities of these 1941 standards could not be fully utilized when they were adopted, because existing television transmitting and receiving apparatus had not yet been developed to that point (Tr. 7988, 8946-47, 9345-47). In fact, these standards still leave room for further improvement in existing black and white television broadcasting and reception. The standards were set in order to provide the highest possible performance within a 6-megacycle channel, both for the time when they were adopted and for the future (R. 569).

In stating the basis for its authority to adopt any standards at all, the Commission said in 1940 that, as a practical matter, standards were needed in order to "assure to the public in basic outline a single uniform system of broadcasting which will enable every transmitting station to serve every receiver within its range."*

This statement was made in connection with the Commission's refusal to standardize on a system having 441 lines and 60 fields** per second. The standards finally

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* FCC, REPORT OF THE COMMISSION IN THE MATTER OF ORDER No. 65 SETTING TELEVISION RULES AND REGULATIONS FOR FURTHER HEARING, Docket No. 5806, p. 2 (May 28, 1940). The record in Docket No. 5806 was incorporated by reference in the proceedings here under review at the request of Commission counsel (Tr. 8873).

** Two "fields" in black and white television make up one "frame" or a single picture.

adopted on May 3, 1941 had 525 lines instead of 441, and the Commission stated that 525 lines and 60 fields "give substantially equal resolution and more fully exploit the possibilities of the frequency bands allocated for television," and noted that these standards "represent, with but few exceptions, the undivided engineering opinion of the industry."*

The permanent nature of the standards, once adopted, and the high quality of the service that can be provided within those standards, are the foundation upon which the present television broadcasting service rests (R. 559, 569-70, 608-09).

Although World War II delayed the commercial development of television on any substantial scale until the end of 1946, the growth of the television industry has been without parallel in the history of American industry. On January 1, 1947, there were an estimated 15,000 television receiving sets in the hands of the public. On January 1, 1948, the number is estimated at 200,000; on January 1, 1949, at 1,000,000; on January 1, 1950, at 4,000,000; as of the effective date of the order, at more than 9,000,000; and as of March, 1951, it is estimated that 12,000,000 black and white television receivers are in the hands of the public (R. 608).

These 12,000,000 television receiving sets represent an investment of $3,000,000,000 and a television broadcasting audience of 45,000,000 people.**

At the same time, black and white television broadcasting has also grown to the point where the public is now receiving television broadcast programs costing $150,000,000 a year (R. 607-08).

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* FCC, REPORT, Docket 5806, pp. 2, 3 (May 3, 1941).

** The figures referred to by the District Court were as of November, 1950 (R. 794). At that time there were more than 9,000,000 television receiving sets in the hands of the public and a television audience of 35,000,000 people.

The interdependence of the number of receivers in the hands of the public capable of receiving a service and the ability of the broadcaster to furnish a service to those receivers is basic to the economics of all broadcasting (R. 608; Tr. 7229-31, 8027-28).

At the outset, television broadcasting was conducted at substantial financial loss to the television broadcaster. As a result of the steady and rapid increase in the number of television receivers in the hands of the public, the broadcasters have been able to increase and expand their program service. Before the order there was the prospect of a television audience sufficient to permit the widespread broadcasting of television programs without financial losses. Indeed, some television broadcasters are now able to render their service without loss (R. 610-11; Tr. 7230).

In only four years the television industry has attained a public acceptance and is rendering a public service far beyond the highest expectations anyone had either in 1941 or in 1946.

The growth of television has been based upon the high-quality transmission standards for black and white television which were recommended by the industry and adopted by the Commission in 1941 (R. 569-70, 608-09).

Under these standards every television transmission can be received by every television receiver within its range (R. 559, 563, 608). Under the order this would no longer be true.

If the order goes into effect, broadcasters face the prospect of putting on CBS incompatible color programs to a non-existent audience.

The Incompatible CBS System.

While the order takes the form of amendments to the Commission's "Standards of Good Engineering Practice Concerning Television Broadcast Stations", the effect of

the order is to adopt the color television system of CBS to the exclusion of all other color television systems (R. 420-21, 432-34, 558, 794, 881; Motion to Affirm, p. 3).

In its Notice of Further Proposed Rule Making (FCC 49-948) of July 11, 1949, instituting these proceedings, the Commission proposed, among other things, to consider color television systems, provided that such color systems met two criteria: first, that they operate in a 6-megacycle channel (the frequency channel width allotted to black and white television broadcast stations); and second, that the pictures be received on existing television receivers "simply by making relatively minor modifications in such existing receivers" (R. 26).

CBS proposed a color television system which operates in a 6-megacycle channel, but which cannot be received on any existing black and white receiver (R. 147, 559, 575, 794, 876; Tr. 3411, 4612, 4750-51, 4829, 5134, 6442, 9962, 10022).

Extensive changes or "adaptation" in existing sets must be made in order that the color broadcasts may be received even in low-quality black and white (R. 147-48, 575, 602, 794-95, 876; Tr. 2197, 3280, 3446, 3971, 4829, 4949, 5106, 9413-14, 9554, 10022-23). In addition, after adaptation, a "converter" must be added to get color. The converters demonstrated by CBS utilize a mechanical spinning disc of red, green, and blue filters in order to produce color (Tr. 2671, 3687, 4863-64, 5328, 9139, 9154-64).

Fundamentally the same system had been brought before the Commission twice before, once in 1941 and again in 1946 (Tr. 3078, 8885-86, 8891-92).

The black and white television transmission standards provide for the broadcasting of a television picture which has 525 lines and 60 fields per second. The present black and white standards are such that the picture which appears on the face of the television receiver is comprised of

approximately 200,000 picture elements (Tr. 5328). It is this large number of picture elements which accounts for the high degree of picture detail and the corresponding picture quality produced.

On the other hand, the color television transmission standards adopted by the Commission provide for the broadcasting of a television picture which has 405 lines and 48 color fields per second. With this system, the picture which appears on the face of the television receiver is comprised of only approximately 80,000 picture elements, which is a severe decrease in picture detail and corresponding picture quality (R. 360, 575-76, 584; Tr. 3971, 4734-37, 5088, 5134, 5326-28, 7357-59).

Not a single receiver now in the hands of the public is capable of receiving any picture from television broadcasts on this system (R. 147, 559, 575, 794, 876; Tr. 3411, 4612, 4750-51, 4829, 5134, 6442, 6546, 9962, 10022). The broadcaster will not be able to build upon the 12,000,000 existing receivers. With the incompatible system the broadcaster must start to build circulation all over again (Tr. 7229-31).

Instead of the public, including the 12,000,000 owners of existing black and white receivers, being able to receive the programs of every transmitting station within range, the television broadcasting service must now be split between the two incompatible sets of standards—color and black and white (R. 558-60, 580-81, 608-09, 794).

Each set owner would have to spend $50 or more, or a total of over half a billion dollars, to restore the program service which the 12,000,000 owners of television sets now receive (R. 147-48, 602, 876; Tr. 4747, 4830, 5538-41, 6858, 6889, 8187; Exhibits 204, 282). Even if this expenditure were made, the picture obtained from CBS color transmissions would be only a degraded black and white picture having less than half the detail of present black and white

television pictures (R. 575, 794-95, 876; Tr. 2197, 3280, 3446, 3971, 4829, 4949, 9413-14, 9554, 10022-23).

The further addition of CBS disc color converters would require the 12,000,000 people who now own television receivers to incur the further expense of well over a billion dollars (R. 148-49, 602, 795, 876, 881; Tr. 2671, 3687, 4863-64, 9134-39, 9154-64; Exhibits 204, 408). Again, the picture so obtained would have less than half the detail of that provided by the existing service (R. 360, 575-76, 584; Tr. 5328).

In addition, the spinning disc converters are cumbersome and involve a limitation of picture size to 12½ inches (R. 148-49, 150, 164, 418, 602; Tr. 2030, 3217-18, 3237-38, 3448, 4754, 9202-03). In contrast, more than 90% of the television sets sold today have a picture size of 16 inches or larger (R. 602; *cf.* Tr. 4306, 4754, 9390-91, 9999; Exhibit 386).

The public must also accept the addition of unsightly gadgets to existing sets which have been designed as pieces of home furniture (Tr. 9154-64, 10000).

By no stretch of the imagination can the addition of an adapter costing $50, or a total of over half a billion dollars on the assumption that all existing sets were adapted, nor the further addition of a converter costing $100, or a total of well over another billion and a half dollars on the assumption that all existing sets were also converted, be called minor modifications within the meaning of the Commission's second criterion in its notice instituting the color proceedings. The total price of many new black and white sets is less than $150 (Tr. 9099).

The RCA Compatible Color Television System.

After it became apparent that black and white television was going to achieve the phenomenal success which it now has attained, major efforts in the television industry were directed to the development of a compatible color television

system. Only CBS continued to tinker with its incompatible system, and proposed in 1949-50 the adoption of a system with even less picture detail than that put forth by it in 1941 (Tr. 5648, 8899-900).

Radio Corporation of America (herein called RCA) presented a 14-megacycle system to the Commission in 1946, which was designed to operate in the area of the frequency spectrum which lies above the frequencies in which television now operates (Tr. 2656; Exhibit 206).

That 14-megacycle simultaneous system, unlike the CBS system, had already been so designed that the color transmissions could be received on a black and white set as black and white pictures (*Ibid.*).

The presentation of this simultaneous system, together with the defects of the system which was proposed by CBS in 1946, led to the refusal of the Commission to adopt the CBS system after the 1946-47 color hearings.* The CBS system was rejected because of many of the defects which it still has, even though its system then had a much higher picture quality than it now has by virtue of the use then of a 16-megacycle channel (R. 570-72, 575; Tr. 4752-53, 5558-59).

In 1948 RCA concluded that only a color television system which would operate in a 6-megacycle channel and which would be receivable on all existing television receivers without alteration and without degradation of picture quality could render a public service. The problem was to find a way to transmit the full 14-megacycle picture of the 1946 RCA simultaneous system in a 6-megacycle channel and to do so without loss of picture quality (R. 573; Tr. 2657-59, 2812; Exhibit 206).

By the time the 1949 color hearings commenced, RCA had developed a new and unique combination of the RCA

* FCC, REPORT, March 18, 1947, 11 F. C. C. 1523.

1946 simultaneous system with other electronic techniques. For the first time principles had been developed which made it possible to transmit and receive a color picture having 525 lines, 60 fields, with picture quality equivalent to that of black and white service, in a 6-megacycle channel (Tr. 2658-60; Exhibits 206, 209).

For the first time, a color system had been developed which could be received on all existing receivers as a high-quality, full-definition black and white picture, without so much as touching the receiver, and, at the same time, could be received on appropriate receivers as a color picture (R. 573).

RCA presented evidence with respect to its system, and demonstrated the system, during the course of the color hearings instituted on July 11, 1949. With the exception of CBS and a Commission engineer named Chapin, the engineers and scientists of the entire television industry, including independent experts, testified in favor of a compatible, all-electronic, high-definition color television system, such as that proposed by RCA (Tr. 2529-30, 8199-201, 8266-67, 8384-85, 9397, 9413-14, 9495, 9685).

The RCA compatible, all-electronic color television system is relatively new. On the other hand, the CBS incompatible system has remained basically as it was in 1940 (Tr. 8885-86). And a mechanical disc is still used by CBS with its inherent limitations on picture size, rather than electronic means, to produce color.

As successively demonstrated during the hearings, the RCA compatible system has improved in practical operation by leaps and bounds. This is conceded by all (R. 871-72, 881; Tr. 6130-31, 7994, 8516, 8611, 8882, 9619, 10002, 11282).

For example, the record reflects the following comments of members of the Commission with respect to the RCA system:

The Acting Chairman of the Commission stated to an RCA witness on the record on April 11, 1950 that:

> "... your picture is greatly improved since your first showing." (Tr. 8516)

Another Commissioner commented on March 16, 1950:

> "... we have seen that [the RCA system], and *it produced beautiful color.*" (Tr. 6900)*

The same Commissioner also stated on February 27, 1950:

> "I noticed the marked improvement in your color the other morning at Laurel, and I think we all did, and I was completely surprised by the *life-like reproduction*, particularly in the final RCA picture, where the man inserted flowers in that shallow dish." (Tr. 6130-31)

In addition, by the latter part of the hearings, RCA had developed and demonstrated the tri-color picture tube, one of the greatest inventions in the electronics art (Tr. 7989, 7994, 8130-32, 10040, 11282; Exhibit 382).

As a goal of research, compatibility was a difficult engineering problem. Its achievement was a scientific accomplishment of first importance to the economics of color.

It is compatibility that makes it economically practical for the broadcaster and the sponsor to broadcast in color, their choice programs, in choice time.

With a compatible system the broadcaster does not have to wait for color receivers to appear in quantity. Nor does he have to confine color broadcasts to fringe time (*cf.* Tr. 2980, 2983).

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* Italics ours throughout.

From the standpoint of the public interest, compatibility thus becomes of first importance in promoting color itself. With a compatible system the broadcaster will have every urge to bring color to the public. Without it many cannot afford to do so.

It would be the greatest mistake to conclude that compatibility is simply a method of continuing black and white reception to present owners of receiving sets. The incompatibility of the color standards adopted is bound to be a major factor in delaying the coming of a sound color service on a national basis (Tr. 2980, 2983, 7177, 7229-32, 8015-16, 8027, 8781, 10002-03).

Efforts of Others to Develop Compatible Color Systems.

Color Television Incorporated (hereinafter called CTI) also presented evidence at the hearings with respect to an all-electronic and theoretically compatible system. The CTI system, however, was in a less advanced state of development than the RCA system. After the close of the testimony on May 26, 1950, CTI petitioned the Commission to consider a new all-electronic, compatible color system known as the "uniplex" system (R. 593).

After the hearings had closed, the General Electric Company also announced a new all-electronic, compatible color system (R. 593).

In the meantime, the Hazeltine Electronics Corporation, one of the leaders of the industry in television research and development, had been experimenting with various aspects of all-electronic, compatible color television systems including, in particular, the RCA system (R. 372, 593).

It was thus apparent well before the adoption of the order, that major efforts in the electronics industry were being directed to the development of a compatible, high-

definition, all-electronic color television system, and that these efforts were achieving and had achieved marked success.

The Rejection of Compatible Standards.

The taking of testimony before the Commission ended on May 26, 1950, and on September 1, 1950, the Commission issued its First Report, which purported to evaluate the CBS, CTI and RCA systems, but adopted none of them.

With respect to compatible color television systems, the Commission recognized that "fundamental research cannot be performed on schedule" and that "much of the fruit of this research is only now beginning to emerge" (R. 165-66). Accordingly, the Commission stated that it wished more time before freezing standards for color.

On the other hand, the Commission also found defects in the CBS incompatible system, ten years old and at least once rejected as it was, which the Commission thought should be overcome before adoption, even assuming that an incompatible system should in any case be adopted. These limitations were susceptibility to flicker, low picture detail, and limited picture size (R. 163-65).

The Commission stated *as to all three of these limitations* that the adoption of the CBS system without further information would mean that the Commission was

> "compelled to *speculate* as to an important basis for its decision. . . ."

and that

> "the Commission's determination on an important part of its decision would be based on *speculation and hope*. . . ." (R. 165).

In spite of these clear statements that a decision could not properly be made *without further information* and fur-

ther opportunity for the development of all systems, the Commission on October 10, 1950 adopted standards for the CBS incompatible system without receiving such further information as to the CBS system, refusing to consider further information with respect to the RCA system, and without according opportunity for further development (R. 408-09, 410-12, 418-20, 427-29, 430-31, 870-71, 879-81; Tr. of Proc. 233-34).*

The Commission's First Report clearly shows that the ultimate adoption of the degraded, incompatible CBS standards on October 10, 1950, was occasioned solely by the Commission's desire to adopt *a* color system—any color system—immediately, without regard to the rapidly advancing progress of the art.

While recognizing the desirability of compatibility, the Commission ruled this all-important matter out as a factor in the selection of systems on the basis of its opinion, "based upon a study of the history of color development over the past ten years", that compatibility is "too high a price to put on color" (R. 156).

No mention is made of the fact that many of these ten years were war years—or of the fact that even black and white television did not really start until four years ago—or of the fact that the present recognition that color television should occupy only 6 megacycles did not come until 1948 (R. 577-78; Tr. 2657-59, 2812; Exhibit 206).

Nor is any effect given in the Report to the tremendous strides which have been made in the development of compatible, all-electronic, high-definition color television systems.

If the Commission's reasoning were to be followed, CBS should receive an accolade for arriving, in 1950, at a point below where they were in 1940; and the entire body

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* Reference is made in this manner to the Transcript of Proceedings in the District Court.

of television engineers should be castigated for making progress. In fact, this is precisely what the Commission did.

The Commission expressly stated that in spite of the necessity for it to rely upon industry experts for data and expert opinion in arriving at standards, and in spite of the fact that its own facilities are concededly too limited to gather much of the data, it would nevertheless disregard the virtually unanimous views of industry experts as set forth in the record (R. 162-63, 578-79, 589).

(a) *Rejection of Expert Evidence.*

There appeared before the Commission responsible experts of many television industry committees and of many industry laboratories. Dr. DuMont and Dr. Goldsmith of the Allen B. DuMont Laboratories appeared. Dr. Baker of the General Electric Company, D. B. Smith of Philco, and Dr. Lee DeForest appeared. Dr. Engstrom and Dr. Brown of RCA appeared. Independent experts such as Donald G. Fink of the Joint Technical Advisory Committee appeared. All these people, and others, testified: (a) that a compatible system should be adopted; (b) that a high-quality system should be adopted; and (c) that the Commission should not stultify research by accepting anything less (R. 589; Tr. 2529-30, 3896, 4849-50, 5499, 5903, 7974-76, 8095, 8199-200, 8266, 8385-86, 9397, 9495, 9696, 9866, 10046-47, 10057).

All these people have high and honorable reputations in their professions. All these people have heretofore been respected and heeded by the Commission. None of these people advocated the adoption of the CBS system (R. 589).

These men, and indeed the whole profession of radio engineering, are stingingly indicted in the separate concurring opinion of Commissioner Jones attached to the First Report, even to the point of implying that all these engineers had

prostituted their professional integrity to the economic desires of their respective companies.* This indictment comes from a man with no engineering training with respect to an industry which has a record of a more dynamic and rapid advance than any other, and of an engineering group which has accomplished modern miracles.

As stated by Donald G. Fink, a distinguished independent electronics engineer and an outstanding editor in the field of electronics (R. 578-79):

> "We wonder whether the worthy Commissioner knows the men he so recklessly and immoderately attacks. The combined membership of these [engineering] committees comprises 121 men, 45 of whom are fellows of the IRE [Institute of Radio Engineers], 25 directors, past and present, of the IRE, the present president of the IRE and eight past presidents, six men who hold the IRE Medal of Honor and four others who have won the IRE Morris Liebmann Memorial Prize.
>
> "An indictment of these men is an indictment of the whole profession of radio engineering. They have built the radio service of the United States from its earliest days, they have managed the technical effort in electronics during two wars. Without their cooperation, the FCC simply cannot function in regulating its highly technical domain.
>
> "When one man aligns himself against a whole profession, fair-minded men will conclude that the man is wrong."

(b) *The Refusal to Allow the Time Previously Recognized as Necessary for Development.*

Many of the industry experts advocated the RCA simultaneous system in 1946-1947. The Commission itself re-

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* The Commission in its First Report endorses the views of Commissioner Jones with respect to this expert evidence (R. 162-63).

jected the CBS system at that time, at least in part because of the presentation of the RCA simultaneous system.

At that time the Commission noted that it would take from four to five years to develop this system into a commercial service (R. 570-71, 574). In 1948 the Commission still regarded four or five years as an appropriate period of time for the commercial development of the RCA color system (R. 574). Commissioner Hyde, speaking for the Commission in January of 1948 before the House Committee on Appropriations, stated with respect to standardization on a color system:

> "But the Commission felt, after hearing all of the evidence, that there was room for a good deal more improvement, and that if we crystallized the thing now by establishing standards which would control, that the public would not have as good service as will be possible in the reasonably early—near future. It was indicated it would be 4 or 5 years before it would be possible to do much about it." *(Hearings before Subcommittee of the Committee on Appropriations on the Independent Offices Appropriation Bill for 1949,* 80th Cong., 2d Sess., 1035 (1948))

A majority of the then Commission, including Chairman Coy, Commissioners Sterling and, of course, Hyde, were present in the hearing room when this statement was made (R. 574).

Within less than these four or five years, RCA had already done more than was contemplated in 1947. By the addition of new electronic techniques, RCA had succeeded in enabling its simultaneous color television system to operate in a 6-megacycle rather than a 14-megacycle channel, without loss of picture quality (Tr. 2656-60, 2812, 6130-31, 6139, 6900, 8516; Exhibits 206, 209).

In addition, RCA had developed the single direct-view tri-color picture tube, one of the greatest inventions of the television art, and upon which all proponents of color television systems recognize their dependence (Tr. 4583, 6253, 6862-64, 7889, 7994, 8201, 8279-80, 9618-19, 11281-82).

In the light of these facts, the Commission's rejection of the experts of the industry amounts, in fact, to nothing less than a refusal to let research and development in the television industry take its necessary course.

(c) *The Commission Also Has Ignored Wholly Independent Evidence.*

The Commission has rejected not only the virtually unanimous expert opinion of television electronics engineers, but in addition has ignored the evidence of concededly impartial scientists.

Dr. Edward U. Condon, Director of the National Bureau of Standards, under date of May 20, 1949, was requested by the Chairman of the Senate Committee on Interstate and Foreign Commerce to organize a committee to give "sound, impartial, scientific advice" on color television. This committee, known as the Condon Committee, was headed by Dr. Condon and consisted of "a small group of scientific persons of repute, none of whom are employed by or have any connection directly or indirectly with any radio licensee or radio-equipment manufacturer" (R. 333, 582-83, 872-73).

The Report of the Condon Committee, which was released July 10, 1950,* considered at length the three color systems which had been proposed and analyzed the present and potential performance of those systems. The distin-

* The Condon Report is printed as SEN. Doc. No. 197, 81st Cong., 2d Sess. (1950). See R. 330-97.

guished group of scientists composing this Committee stated its hope that "the report will provide a comprehensive and understandable basis on which the technical factors may be considered in arriving at a decision."

The Report of the Condon Committee was based on the testimony and demonstrations given before the Commission and upon certain other demonstrations and tests (R. 335-36, 358, 364, 583).

Neither Report of the Commission mentions the findings and conclusions of the Condon Committee. In fact, one Commissioner has publicly stated that the Commission did not even consider the Report of the Condon Committee in reaching its decision (R. 589). And appellees have gone so far as to state that the Commission could not lawfully consider this Report (Appellees' Brief in District Court, p. 28; Motion to Affirm, pp. 21, 23).

With respect to the Condon Report, the majority of the District Court stated:

> "No doubt this report refutes numerous of the findings made by the Commission and gives a far more favorable appraisement of the RCA system than that attributed to it by the Commission." (R. 873)

A table showing some of the important conflicts between the findings with respect to the RCA system made by the Condon Committee and the findings made by the Commission is set forth in Appendix B of this Brief.

One of the most significant observations, however, is that the Condon Committee found that the "effectiveness of channel utilization of the RCA color system is the highest of all the systems" proposed to the Commission during the color hearings (R. 370).

Spectrum space is scarce. The conservation of radio frequencies is one of the most important responsibilities

of the Commission in order that the fullest service may be obtained.

The fact that the RCA color system makes the most effective use of the radio frequency spectrum is not even mentioned in the Commission's Reports, in spite of the fact that the Communications Act specifically enjoins the Commission to encourage "the larger and more effective use of radio in the public interest" (§303(g)), and in spite of the fact that the Commission has heretofore regarded this as one of its paramount duties (R. 586-88).*

The Commission's attempt to discredit the industry experts who appeared before it can hardly stand up in the light of the Condon Report (R. 589).

(d) *The Commission's Reliance on Interested Staff Engineer.*

The Commission's refusal to credit the testimony of the leading engineers of the television industry and of independent electronics experts, including the Condon Committee, is to be contrasted with the fact that the only witnesses who testified in favor of the adoption of the CBS system were CBS and Chapin, one of the Commission's staff engineers (R. 581).

The testimony of the CBS engineers in favor of the adoption of a ten-year old system is obviously testimony with a bias. Unlike the electronics experts seeking to advance the forefront of science, these people sought only to defend ten years of tinkering with a mechanical disc.

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* Thus, the Commission stated in 1941, in rejecting a black and white television system of 441 lines in favor of the present system of 525 lines, that the latter is preferable by reason of the fact that it "more fully exploit[s] the possibilities of the frequency bands allocated for television". FCC, REPORT, Docket No. 5806, p. 3 (May 3, 1941).

With respect to Chapin, the record shows that he was the co-inventor of an automatic switch usable with the CBS system but not with a compatible color system. While Chapin forswore any financial interest in the invention, the interests of prestige and reputation through the adoption of the CBS system and the consequent use of his invention remained (R. 12-13, 581).

Although RCA objected,* this engineer was allowed to continue in the proceedings and subsequently gave testi-

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* The record reflects the objection and the response of the Chairman of the Commission as follows:

"Mr. McDaniel: Mr. Chairman, I understand that this development of Mr. Chapin's constitutes what might be considered an improvement in the particular system being proposed by CBS in these proceedings.

The Commission in this case is in a judicial capacity, I assume, because it may have to choose between contesting proponents here, and when the Commission comes forward with a development which seems to be an improvement in the system proposed by one of the litigants, it sounds a little bit like a person in a judicial capacity assisting one of the parties in the contest.

I just want to make that statement and say that we take exception to putting this development into these proceedings, because we think it is inconsistent with the judicial position which the Commission should take in the proceedings.

Mr. Salant: Would you like a statement from me?

The Chairman: I think not, unless you feel called upon. I think I can take care of it myself.

Mr. Chapin, who is putting this in, and another employee of our Commission, have developed this and have filed for patents on the development. Mr. Chapin is the head of our laboratory, he is not a member of the Commission, and in no way in position to determine the vote of a single member of the Commission; nor is any other member of the staff of the Commission. The Commission is perfectly competent and has the ability to determine between contesting forces in these hearings, whether it is RCA, CBS, DuMont, CTI, or anyone else; and I want to say on the record that I resent the suggestion very much that the Commission is influenced in its determination by the work of a single member of its staff or all of its staff when it comes to making a decision on the record in these proceedings.

If there is anything else to be said on this, let's get it off our chest now." (Tr. 5980-82)

mony favorable to the CBS system. His predisposition is attested to by his comparison of the RCA color receivers with the CBS color receivers. Chapin stated that the CBS receivers were superior to the RCA receivers because the latter were too big and too complex. But his testimony related to certain RCA receivers having over 100 tubes used by RCA in the early part of the color hearings and completely ignored later RCA color receivers using less than one-half this number of tubes, which were demonstrated to Chapin *before* he gave his testimony. It was not until cross-examination by RCA, however, that these facts were brought out (R. 582; Tr. 10626-30).

Chapin was not merely a witness. On the contrary, Chapin had charge of the Commission's laboratory which tested the color systems. In addition, Chapin participated in the formulation of the order and reports of the Commission which are under review, and the Commission relied on his advice in weighing the highly technical issues before it (R. 12-13, 581-82).

Only two of the seven members of the Commission have had technical training, and one of the two dissented from the adoption of the order. He was formerly Chief Engineer of the Commission. The rest are laymen (R. 581). Although the order purports to rest upon judgments of a highly complicated electronics art, it is notable that the Commission has found it necessary directly to repudiate every disinterested industry expert who appeared before it, and that many of its findings are supported only by the testimony of CBS or by Chapin.

Only by refusing to pay attention to the overwhelming evidence supporting the adoption of an all-electronic, compatible, high-definition color television system given by those who knew and had faith in the electronics art, and by relying upon the proponents of an out-moded mechanical

method, could the Commission attempt to justify arresting the development of television by the adoption of the CBS system.

The Conditions Upon Which the Commission Said the Adoption of the CBS System Might Be Avoided.

The Commission itself, however, was unwilling to adopt the CBS system. By its First Report, the Commission did not adopt commercial color television standards. Recognizing the incompatibility of the CBS system, its need for greater picture detail and for larger picture sizes, the Commission sought to permit the development of color television systems to proceed, but only upon conditions (R. 163-68, 192, 869-70).

The Commission proposed (1) that if most of the television manufacturing industry would agree to change its entire production of black and white television receivers from and after early November, 1950, so that such receivers would operate on a wholly new and continuously variable set of black and white standards (including the number of lines and fields called for by CBS standards), and (2) that if such continuously variable or "bracket" black and white standards could be adopted by the Commission *without a hearing,* then and only then would the Commission consider improvements in all proposed color systems, as well as possible new color systems, before reaching a final decision. If either of these two conditions were not met, the Commission stated it would adopt forthwith the CBS color system (R. 166-68).

The Commission's Notice instituting the hearings, it should be noted, made no mention of these so-called bracket standards. Nor was there any evidence in the hearings with respect to such standards. As one Commissioner, the former Chief Engineer, stated in his dissent (R. 421):

> "The subject of bracket standards was not at issue in the hearing nor was the subject even advanced during the hearing. * * * the subject of bracket standards was a new concept in field and line scanning proposed after the hearing record closed. It came as a surprise to industry and was not based upon information appearing in the record of this proceeding."

The Commission requested the television manufacturing industry to submit comments with respect to this proposal. In response to this, comments were filed and, with minor exceptions, those of the television manufacturing industry who submitted comments stated that to change their production of black and white receivers in accordance with the Commission's proposal was impractical, unnecessarily costly to the public, and could not be done in accordance with the time schedule required by the Commission (R. 309-16, 421-27, 576-77, 870).

These comments also pointed out: (a) that the attempt to regulate television receiver manufacturing was beyond the jurisdiction of the Commission; and (b) that the procedure for the adoption of bracket standards without a hearing was contrary to proper administrative procedure and to the Commission's own rules (R. 306-09, 316, 576-77).

The Commission's Refusal to Consider New and Determinative Developments.

It is plain that the Commission's First Report recognized the need for further information as to the rapidly developing technical aspects of color television (R. 164-66). It is equally plain that the Commission should have considered such further information as was available before adopting the CBS standards, particularly in view of the fact that the bracket standards proposal was entirely impractical (R. 190-93, 306-16, 421-31, 592-93, 871-72, 878-81).

On July 31, 1950, RCA had submitted to the Commission its Progress Report concerning the realization of improvements in its system apparatus which were stated during the hearings to be in progress (R. 399-404).

In its Comments in response to the Commission's bracket standards proposal, RCA called the Commission's attention to other evidence relating to compatible, high-definition, all-electronic systems, including the RCA system, and submitted copies of the Condon Report and its Progress Report (R. 330-406).

In its Petition of October 4, 1950, filed after it had become apparent that the bracket standards proposal was impractical, RCA formally asked the Commission to review the improvements made in the performance of the RCA system and to view experimental broadcasts of color signals of the RCA, CBS, CTI, and other systems, before making a final determination in respect of color standards (R. 408-09).

Meanwhile, others, including the General Electric Company, Hazeltine and CTI, had also called the Commission's attention to further developments in compatible, all-electronic, high-definition color television systems (R. 593).

Nevertheless, the Commission refused to consider any of these important developments and denied the RCA Petition out of hand. On October 10, 1950, the Commission published its Second Report adopting the CBS system and concluding, *without looking at them,* that no improvements in existing systems warranted a reopening of the record (R. 419-20).

In this connection, the majority of the District Court said of the Commission's refusal to further inform itself:

> "Admittedly, much progress was made during the latter portion of the hearings and, as claimed, after the hearings closed, in the development of a compatible system of color television. Particularly was

> such progress made by RCA, and as we view the situation the most plausible contention made by plaintiffs is that the Commission abused its discretion in refusing to extend the effective date of its order so that it might further consider the situation, and particularly the improvement which it is claimed had been made by RCA and others." (R. 871-72)

In dissenting from the decision of the District Court, Judge La Buy stated:

> "... it is difficult to understand why the Commission refused to hear additional evidence and chose instead a course of action, using its own words, based 'on speculation and hope rather than on demonstrations.'" (R. 881)

In addition, the majority of the District Court also stated:

> "... a number of critical findings [of the Commission] are based upon evidence which was taken in the earlier stage of the proceeding which is not representative of the situation as it existed at the time the findings were adopted." (R. 871)

The Proceedings Before the District Court.

On October 17, 1950, appellants RCA, National Broadcasting Company Inc. (herein called NBC) and RCA Victor Distributing Corporation brought suit in the District Court of the United States for the Northern District of Illinois, Eastern Division. This suit was brought to enjoin, set aside, annul and suspend the order of the Commission adopting the incompatible CBS color television system to the exclusion of any other color television systems. The order by its terms was to go into effect on November 20th. The complaint prayed both an interlocutory and a permanent injunction and a temporary restraining order while the suit was *sub judice*.

RCA is engaged, among other things, in research and development work in the field of electronics and particularly in the field of radio and television, both black and white and color. RCA is also engaged in the manufacture and sale of radio and television transmitting and receiving apparatus and tubes. NBC, which is owned by RCA, is engaged in sound and television broadcasting and in sound and televion network broadcasting. The RCA Victor Distributing Corporation, an Illinois corporation, also a subsidiary of RCA, is engaged in the sale of television receivers and other products made by RCA Victor Division, the manufacturing division of RCA, to dealers located in Chicago and other cities (R. 2-3, 598, 606-07, 612, 863-64).

CBS was allowed to intervene in support of the order by agreement of the parties (R. 789-90, 864).

Various intervener-appellants were permitted by the District Court, over objection of appellees, to intervene for the purpose of attacking the Commission's order. Intervener-appellants are Emerson Radio & Phonograph Corporation, Pilot Radio Corporation, The Radio Craftsmen, Incorporated, and Wells-Gardner & Co., manufacturers of radio and television receivers and equipment; Sightmaster Corporation, which was also a manufacturer of television receivers and equipment until production was discontinued by reason of the order of the Commission under review; Local 1031, International Brotherhood of Electrical Workers, AFL, a labor union whose members are primarily employed by manufacturers of television receivers, parts and equipment and whose members are owners of television sets affected by the order; and Television Installation Service Association, an association of small business men engaged in the installation and servicing of television receivers (R. 790-92, 864).

Appellees moved for summary judgment and dismissal of the complaint on the ground that there was no genuine issue as to any material fact and that appellees were entitled to judgment as a matter of law (R. 437-38, 864).

A three-judge court was convened as required by Title 28, United States Code, Sections 2284 and 2325 (62 Stat. 968, 970). On the issues thus presented, the matter came on for hearing and oral argument was heard on November 14, 15, and 16, 1950 (R. 864).

At the conclusion of the hearing, the court took the conflicting motions under advisement and at the same time entered a temporary restraining order "restraining and suspending until further order of this court the promulgation, operation and execution of the order of the Federal Communications Commission adopted October 10, 1950, effective November 20, 1950" (R. 792-93, 865).

On December 22, 1950, and January 23, 1951, the District Court, by a 2-1 vote, entered orders granting summary judgment in favor of the appellees and against the appellants, including the plaintiff-appellants, and dismissing the complaints, including the intervening complaints (R. 878-79, 882-83). The court unanimously continued in effect the temporary restraining order until April 1, 1951, or until terminated by this Court. The court also unanimously readopted the findings and conclusions theretofore made in support of the temporary restraining order (R. 793-96, 878, 882).

Although the majority of the District Court granted summary judgment in favor of the appellees and dismissed the complaints, the most significant aspect of its decision lies in the fact that the District Court did not decide many of the determinative issues involved either in favor of appellants or in favor of appellees (R. 863-79). Certain arguments of appellants were mentioned and rejected. Others were not mentioned at all. The arguments of appellees

were mentioned and their validity questioned. And the District Court did not find or hold that the order was supported by substantial evidence.

The District Court was apparently motivated in this respect by the fact that appellees urged the District Court to speed the case to this Court. Thus the District Court stated:

> ". . . in studying the case, we have been unable to free our minds of the question as to why we should devote the time and energy which the importance of the case merits, realizing as we must that the controversy can only be finally terminated by a decision of the Supreme Court. This is so because any decision we make is appealable to that court as a matter of right and we were informed during oral argument, in no uncertain terms, that which otherwise might be expected, that is, that the aggrieved party or parties will immediately appeal. In other words, this is little more than a practice session where the parties prepare and test their ammunition for the big battle ahead." (R. 866)

That part of the District Court's opinion which states the basis for its decision reads as follows:

> "Thus, as we evaluate the situation, there are two courses open, (1) to allow defendants' motion for a summary judgment, and (2) to vacate the order and send the proceeding back to the Commission for further consideration in view of recent developments in the color television field as well as the rapidly changing economic situation. A pursuance of the latter course, assuming we have such authority, of which there may be doubt, would inevitably result in the prolongation of the controversy which badly needs the finality of decision which can be made only by the Supreme Court. In other words,

the interests of all, so we think, will be better served with this controversy on its way up rather than back from whence it comes." (R. 875)

Specification of Errors.

The United States District Court for the Northern District of Illinois, Eastern Division, erred:

1. In failing to hold that the order of the Commission is contrary to law and is not supported by the Commission's conclusions, by its findings or by substantial evidence.

2. In failing to hold that the refusal of the Commission to permit the commercial broadcasting of compatible color television systems in competition with incompatible color systems exceeds the Commission's lawful jurisdiction and is not supported by the Commission's conclusions or its findings or by the evidence.

3. In failing to pass on many of the important issues presented to it for determination.

4. In holding that it was without power to consider evidence submitted to it for the purpose of determining whether such evidence should have been considered by the Commission.

These errors are discussed with greater particularity immediately hereafter. For a full listing of the errors specified on this appeal, the Court is respectfully referred to the appellants' Assignment of Errors (R. 886-92).

Summary of Argument.

I.

The adoption by the Commission of television transmission standards which cannot be received on any of the 12,000,000 receivers now in the hands of the public violates the statutory standard of the "public interest, convenience or necessity" as construed by the Commission itself.

As early as 1940 the Commission adopted the principle that the public interest required the fixing of television transmission standards which permit all receivers to obtain pictures from all transmissions, which permit the highest quality of service known to the art while leaving ample room for all foreseeable improvements, and which are adopted only after the potentialities of basic research have been fairly explored.

Each of these principles is of first importance to the public. Compatibility has in fact became a practical necessity by virtue of the fact that 45,000,000 people now receive television service on 12,000,000 receivers, and only after expensive adaptation could these 12,000,000 sets receive any picture whatsoever under the order of the Commission.

All of the principles by which the Commission has heretofore given specific content to the standard of the "public interest, convenience or necessity" are violated by the order under review. This has been done although it is clear from the record as a whole that color television can be made available to the public without violating these principles.

II.

The Commission's record in this case is concededly inadequate and its findings and the order purportedly based thereon are not supported by substantial evidence.

This is a case in which the Commission has in its own words acted on the basis of "speculation and hope". In its First Report, the Commission purported to evaluate both the RCA system and the CBS system, *but it did not adopt either.* It stated that it should have additional information with respect to important matters, as otherwise it would be

> "compelled to speculate as to an important basis for its decision . . ."

and that

> "the Commission's determination on an important part of its decision would be based on speculation and hope . . ." (R. 165)

Thus, the Commission conceded in its First Report that the record before it was inadequate to enable it to discharge its duties. The Commission nevertheless in its Second Report adopted the CBS system on this same concededly inadequate record. No additional evidence whatsoever on these matters was taken or considered.

Furthermore, the Commission in many instances relied squarely upon clearly superseded and outmoded evidence which can in no sense be considered as substantial.

It is clear on the basis of a review of the record "as a whole" that the action of the Commission cannot be sustained. *Universal Camera Corp.* v. *National Labor Relations Board,* 19 U. S. L. Week 4160 (U. S. Feb. 26, 1951); *National Labor Relations Board* v. *The Pittsburgh Steamship Co.,* 19 U. S. L. Week 4136 (U. S. Feb. 26, 1951).

The "basic findings" which the Commission made in adopting the CBS system and rejecting the RCA system are not supported by substantial evidence. Furthermore, it is

apparent from the omissions from the criteria for the selection of a color system set by the Commission after the hearings, that the ones selected were tailored to make possible the adoption of the CBS system. There is no support in the record for the omission of other and more important criteria which would have precluded the adoption of the CBS system. These are compatibility, high resolution (picture detail), unlimited picture size, absence of flicker, and effectiveness of channel utilization. The record establishes the paramount importance of these omitted criteria.

III.

The Commission has departed from the principle it followed for over a decade that there should be a single set of standards for television and has adopted multiple or competitive "standards." In taking this action, however, it limited the area of competition by excluding compatible color. Its Reports contemplate that the present system of black and white must face competition with CBS black and white. But CBS color is immunized from competition with compatible color.

The uncontradicted fact is that the broadcasting of compatible color would hurt nobody. Having abandoned the principle of standardization for one of competition, the Commission cannot lawfully limit the area of competition to exclude compatible color. The general policy of the Communications Act, as it relates to broadcasting, is one of competition. *Federal Communications Commission* v. *Sanders Brothers Radio Station,* 309 U. S. 470.

The Commission made no findings that competition between color systems for public approval and acceptance should not be permitted. Administrative action is legally valid only if based on findings. *Ashbacker Radio Corp.* v.

Federal Communications Commission, 326 U. S. 327; *United States* v. *Carolina Freight Carriers Corp.*, 315 U. S. 475.

It does not appear that the Commission even considered whether there was any middle ground between the exclusive adoption of an incompatible color system and the exclusive adoption of a compatible system, such as permitting the broadcasting of both compatible and incompatible color in competition with each other. Before the Commission could rule out compatible color completely, such alternative consideration was required by it under the decision of this Court in *Jacob Siegel Co.* v. *Federal Trade Commission*, 327 U. S. 608.

This is particularly true in a case such as this, where the action of the Commission has the effect of suppressing scientific development, which in turn involves the stultification of the priceless national resource of invention and research.

IV.

The Commission violated its duty under the Communications Act and the Administrative Procedure Act to keep itself informed and to take account of determinative facts. The Commission in other situations has expressly recognized that it would be a violation of its obligations under the Communications Act to disregard any facts relating to the proper exercise of its duty to fix television transmission standards. In this case, however, the Commission refused to consider information of controlling significance concerning scientific developments which was submitted to it after the testimony was completed on May 26, 1950 but prior to the issuance of its order on October 10, 1950.

Thus the Commission refused even to consider the report of the Condon Committee, the most distinguished group of scientists who have ever undertaken to study the status of color television, although their report made reference to

important facts which had not theretofore been available to the Commission. The conflict between the Commission's Reports and the Condon Report alone should have caused the Commission to inquire further before taking the action here under review.

Similarly the Commission totally disregarded the RCA Progress Report which was submitted after the close of testimony on May 26, 1950. Although the RCA Progress Report set forth facts subject to ready verification, the Commission ignored the reported facts and made findings as to what *could not be done* with the RCA system which were in substantial conflict with what the RCA Progress Report stated *had already been done.*

Appellees seek to justify the Commission's refusal to consider these reports on the ground that, in a rule-making proceeding, it would have been unlawful for the Commission to consider anything beyond the formal transcript of testimony and exhibits received in evidence at the hearings. If this position is upheld by this Court, the legislative rule-making process of administrative agencies will be encased in a strait-jacket.

The Condon and RCA Progress Reports were formally submitted by RCA to the Commission prior to its order. The Commission's failure to consider these reports was therefore also a violation of its duty under Section 4(b) of the Administrative Procedure Act to consider all relevant matter presented in rule-making proceedings.

V.

The court below in this case did not afford appellants proper judicial review of the Commission's action.

The court expressly followed a standard of judicial review which this Court has since held to be improper. *Universal Camera Corp.* v. *National Labor Relations Board,*

supra; National Labor Relations Board v. *The Pittsburgh Steamship Co., supra.* In spite of the admittedly inadequate record and appellants' contention that the Commission's action was not supported by substantial evidence, the court below failed to review "the record as a whole", and failed to rule on the question of whether the Commission's order and findings are supported by substantial evidence.

Furthermore, many other important questions involved in this case were left unresolved by the court below. It is apparent that the District Court considered the case before it, to use its own words, as "little more than a practice session", and intended to leave the decision to this Court. For all practical purposes, therefore, appellants have not as yet been given their day in court.

VI.

In adopting the CBS system the Commission relied for technical advice regarding controlling technical issues on a staff engineer who had an interest in the adoption of the CBS system. Although five of the seven members of the Commission are laymen, many of the issues were of a highly technical nature. The interested engineer participated in the decision-making process. His testimony and that of CBS was accepted and acted upon by the Commission. The testimony of independent and industry experts was disregarded. The public interest in administrative action free from any taint of interest is so great that an order arrived at under these circumstances cannot be upheld.

ARGUMENT.

POINT I.

The Adoption of the Incompatible CBS Color Television Standards Is Contrary to the Public Interest.

The guiding statutory standard for the Commission as set forth in the Communications Act of 1934, as amended, is the "public interest, convenience, or necessity". The Supreme Court has made it clear that this statutory standard is not without specific meaning and specific limitations any more than are similarly generalized standards set forth in other statutes. In *National Broadcasting Co.* v. *United States,* 319 U. S. 190, 216, the Supreme Court stated, quoting with approval from earlier decisions:

> "The Commission was, however, not left at large in performing this duty. The touchstone provided by Congress was the 'public interest, convenience, or necessity,' . . . 'This criterion is not to be interpreted as setting up a standard so indefinite as to confer an unlimited power. . . .'
>
> "The 'public interest' to be served under the Communications Act is thus the interest of the listening public in 'the larger and more effective use of radio.' §303(g)"

It is this interest of the listening public which appellants seek to vindicate. When, as here, the Commission has disregarded the very rights which it is required to protect, these rights can only be protected by the courts. As this Court said in *Scripps-Howard Radio, Inc.* v. *Federal Communications Commission:*

> ". . . But these private litigants have standing only as representatives of the public interest. [citing

> cases] That a court is called upon to enforce public rights and not the interests of private property does not diminish its power to protect such rights. 'Courts of equity may, and frequently do, go much farther both to give and withhold relief in furtherance of the public interest than they are accustomed to go when only private interests are involved.' *Virginian Ry. Co.* v. *Federation*, 300 U. S. 515, 552. . . ."
>
> *Scripps-Howard Radio, Inc.* v. *Federal Communications Commission*, 316 U. S. 4, 14-15.

It is only necessary to consider the nature of the public interest which the Commission is required to serve to uncover the lack of support for the Commission's order.

The Communications Act of 1934 itself provides the most important assistance in this quest. The pertinent parts of Section 303 read as follows:

> ". . . the Commission from time to time, as public convenience, interest, or necessity requires shall—
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> • • • • • • • •
>
> (g) Study new uses for radio, provide for experimental uses of frequencies, and *generally encourage the larger and more effective use of radio* in the public interest;"

In its Report of May 28, 1940, which was occasioned by the Commission's refusal to authorize commercial black and white television at that time, the Commission analyzed the public interest with respect to television regulation. This required it to determine the practical course which television regulation must follow to promote the *larger* and *more effective* use of radio. It found that the public interest required the fixing of television transmission standards which:

(a) permit all receivers to obtain pictures from all transmissions, thus providing a "standard gauge" and assuring continuity of service to the public;

(b) permit the highest quality of service known to the art while leaving ample room for all foreseeable improvements; and

(c) are adopted only after the potentialities of basic research have been fairly explored and the industry is in substantial agreement upon them.

A. "The Standard Gauge".

The Commission found that the larger and more effective use of radio in the field of television could only result if a single uniform system was established. The Commission said:

> "Transmission standards may be simply defined as engineering rules governing the characteristics of the radio signal transmitted by the operation of radio apparatus. Such standards as a practical matter must require a fair degree of efficiency and assure to the public in basic outline a single uniform system of broadcasting *which will enable every transmitting station to serve every receiver within its range.*
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> • • • • • • •
>
> " 'However, *a serious question of public interest would arise in the future if the Commission should specify external transmitter performance capabilities differing from the operating capabilities of receivers in the hands of the public.* This is because of the resultant possibility that the public's receivers would be incapable of receiving programs emanating from transmitters licensed by the Commission.'
>
> • • • • • • •

> "It would be a violation of its statutory obligations for the Commission to disregard any facts which might foreclose a proper exercise of its duty to fix transmission standards for a single uniform system of television broadcasting.
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> • • • • • •
>
> "At the same time these basic standards—the standard gauge they may be termed—should afford within their limits reasonable flexibility for future advances in the science of television broadcasting." (pp. 2, 5, 19, 27-28)

The basic authority of the Commission lies in the necessity to prevent electrical interference between broadcasting stations. The exercise of this authority involves the allocation of particular frequencies to particular services and the licensing of broadcasters to use such frequencies in certain locations.

On the other hand, no express authority for the setting of transmission standards is to be found in the Communications Act of 1934. However, no one has questioned the desirability of achieving the results described by the Commission in its May 28, 1940 Report, namely, to provide:

> ". . . a fair degree of efficiency and assure to the public in basic outline a single uniform system of broadcasting which will enable every transmitting station to serve every receiver within its range." (p. 2)

As stated in appellees' Motion to Affirm, the Commission has heretofore adopted technical transmission standards which have assured that the public would receive a uniform satisfactory service (p. 3). There has always been a single set of standards for regular commercial operation of the particular service involved in the use of a particular set of channels (p. 19). Appellants urged this fact upon the

court below and quoted extensively from the Commission's own Reports of May 28, 1940 and of March 18, 1947, which were concerned with television transmission standards.

Both in the court below and before this Court the appellees seek to distinguish these prior Commission Reports by pointing out that in 1940 and in 1947 it was contemplated that color broadcasting might require different standards from black and white.

What the Commission has failed to point out either to this Court or to the court below are the facts that:

1. In 1940 there were virtually no television receivers outstanding, and very few in March 1947;

2. In so far as it was contemplated in 1947 that color broadcasting might require different standards from black and white, it was also contemplated that color television occupy a *different portion of the radio frequency spectrum* than the black and white service;

3. In contrast, it is now accepted that color television will occupy the *same portion of the radio spectrum* as the existing television service; and

4. Not until millions (let alone the present billions) of dollars were actually invested by the public in television receivers did compatibility become a practical necessity.

Indeed, appellees' attempt to deny the plain facts of life so far as radio and television are concerned is also to be contrasted with the testimony of the President of CBS in these hearings:

> "Normally in the field of radio and television, *when a consumer buys a receiver he knows that he can, in general, get all the signals in his area. That has usually been considered as the purpose of standards.*" (Tr. 7117)

In addition, appellees' Motion to Affirm expressly admits that the purpose of the Commission in adopting transmission standards is to ensure that there will always be a single set of standards for the regular commercial operation of the particular service involved (p. 19). In spite of this, the principle that every television transmitter must be receivable by every television receiver within its range has been discarded by the order. The order of the Commission here under review for the first time in the history of the federal regulation of radio provides for two incompatible sets of operating standards for a single set of channels* (R. 558-60, 579-81, 608-09; *cf.* Tr. 4734).

B. Efficiency and Room for Improvement.

The Commission can only discharge its statutory obligation to encourage the larger and more effective use of radio if the standards adopted provide for as high a level of service as is known to the art and leave room for all the foreseeable improvements in the art (R. 108, 558-59, 562-69;

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* Appellees cannot fairly claim that color television is a separate service from black and white television. That they are not separate was conceded as early as 1940 by Dr. Goldmark of CBS who stated:

> "I recommend we stop making a distinction between color and black and white." (Official Minutes of 8th Meeting—Part I of Panel 1, NTSC, p. 14, December 11, 1940. The proceedings of Panel 1 were submitted as Exhibit 254 in Docket No. 5806, at p. 2303.)

Only if color and black and white television had been assigned to different portions of the radio spectrum could they be regarded as two different services. Thus, AM and FM sound broadcasting, which are not compatible with each other, occupy entirely different portions of the radio frequency spectrum. In addition, although it is possible for a broadcaster to broadcast simultaneously both in AM and FM, it will not be possible to broadcast simultaneously on existing television standards and on the incompatible CBS standards because of the shortage of space in the frequency spectrum.

Tr. 7974-76, 7984, 8113, 9405, 9497). Thus the Commission also said in its 1940 Report:

> "In its regulation of television in the public interest, the Commission, in the light of the evidence before it, has set as its goal unfettered technical development and engineering advance. In dealing with the problem of setting television transmission standards the Commission has, therefore, sought to avoid action which would freeze the state of the art at an unsatisfactory level of performance." (p. 3)

In rejecting the CBS system in 1947 the Commission elaborated further on this point:

> "Before approving proposed standards, the Commission must be satisfied not only that the system proposed will work, but also that the system is as good as can be expected within any reasonable time in the foreseeable future. In addition, the system should be capable of permitting incorporation of better performance characteristics without requiring a change in fundamental standards. Otherwise, the danger exists that the standards will be set before fundamental developments have been made, with the result that the public would be saddled with an inferior service, if the new changes were not adopted, or if they were adopted, receivers already in the hands of the public would be rendered useless."*

C. Encouragement of Research—Avoidance of Premature Standards.

Neither the larger nor the more effective use of radio in the television field would result if the standards chosen should be proven wrong by later research. The nature of

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* FCC, REPORT OF THE COMMISSION IN THE MATTER OF PETITION OF COLUMBIA BROADCASTING SYSTEM FOR CHANGES IN RULES AND STANDARDS OF GOOD ENGINEERING PRACTICE CONCERNING TELEVISION BROADCAST STATIONS, Docket No. 7896, 11 F. C. C. 1523, 1525 (March 18, 1947).

standards demands that they should only be fixed after a full investigation of possibilities and with substantially unanimous agreement within the industry as their basis. In its 1940 Report the Commission also said:

> "The keynote of the Commission's report and the policy underlying the Commission's rules was that television broadcasting was still in an experimental stage and that in view of evidence revealing a substantial possibility of significant improvements in the art, 'research should not halt' and 'scientific methods should not be frozen in the present state of the art.' The Commission expressed the belief that the crystallization of standards at the current level of the art, by whatever means accomplished, would inevitably stifle research in basic phases of the art in which improvement appeared promising.
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> * * * * * * *
>
> ". . . Premature crystallization of standards will, as has thus been pointedly illustrated to the Commission, remove the incentive for technical research toward higher levels of efficiency. If technical research having this goal is retarded or halted, the Commission's duty to fix transmission standards with due regard for considerations of public interest will have been, for all practical purposes, nullified.
>
> "It is, therefore, the conclusion of the Commission that in order to assure to the public a television system which is the product of comparative research on known possibilities, standards of transmission should not now be set. It has further been decided that there should be no commercial broadcasting with its deterring effects upon experimentation until such time as the probabilities of basic research have been fairly explored. . . . As soon as the engineering opinion of the industry is prepared to approve any one of the competing systems of broadcasting as the standard system the Commission will consider the authorization of full commercialization. . . .

> "It may be expected that industry opinion will insist upon such standards as will give definite assurance of satisfactory performance and of continuity of service for the public comparable to the continuity of service displayed in the past history of the radio industry. At the same time these basic standards—the standard gauge they may be termed—should afford within their limits reasonable flexibility for future advances in the science of television broadcasting." (pp. 13, 26-28)

The force of administrative practice and construction in determining the legal content of a statutory standard which would otherwise be vague has repeatedly been recognized and relied upon by this Court. For example, in *Norwegian Nitrogen Products Co.* v. *United States*, 288 U. S. 294, 315, the Court stated:

> " . . . True indeed it is that administrative practice does not avail to overcome a statute so plain in its commands as to leave nothing for construction. True it also is that administrative practice, consistent and generally unchallenged, will not be overturned except for very cogent reasons if the scope of the command is indefinite and doubtful. . . . The practice has peculiar weight when it involves a contemporaneous construction of a statute by the men charged with the responsibility of setting its machinery in motion, of making the parts work efficiently and smoothly while they are yet untried and new."

On another occasion the Court said in deciding a question of statutory interpretation of the Motor Carrier Act:

> " . . . In any case such interpretations are entitled to great weight. This is peculiarly true here where the interpretations involve 'contemporaneous construction of a statute by the men charged with the

responsibility of setting its machinery in motion, of making the parts work efficiently and smoothly while they are yet untried and new.' " [Citing *Norwegian Nitrogen Products Co.* v. *United States*, 288 U. S. 294, 315 (1933).]

United States v. *American Trucking Associations*, 310 U. S. 534, 549.

The criteria which the Commission laid down in 1940 for the adoption of television standards have been accepted as valid for a decade by the industry. They are the principles which establish the content of the public interest, convenience, and necessity in the adoption of commercial television broadcasting standards. They were arrived at as a result of the "contemporaneous construction of a statute" by the men charged with the responsibility of setting the television industry in motion within the meaning of the *Norwegian Nitrogen* case. They were reaffirmed again in 1947 and they have not been departed from by the Commission until the promulgation of the order.

D. Violation of the Public Interest.

In 1947 the Commission applied these criteria to the color television system then proposed by CBS (a system substantially superior in performance to that now adopted), and found that its adoption was *not* in the public interest. Since then CBS has changed its system in the direction of lower quality (Tr. 5558-59, 8898-8900). Its adoption violates each of the three criteria for television standards previously specified by the Commission, and, therefore, blocks that *larger* and *more effective* use of radio which the Commission has been commanded by Congress to promote.

The adoption of CBS color television standards does not permit the highest quality of color service known to the art, nor leave room for foreseeable improvements in service

(Tr. 2529-30, 4861-64, 5328, 5555, 6503-04, 6901, 7985-86; Exhibit 384, p. 5).

The adoption of CBS color television standards does not permit all receivers to obtain pictures from all transmissions (R. 147, 359, 575, 794, 876; Tr. 3411, 4612, 4750-51, 4829, 5134, 6442, 6546, 9962, 10022). The order instead deliberately splits the television broadcasting service and deprives the public of continuity of service (R. 558-60, 580-81, 608-09, 794). The order creates a narrow gauge for television transmissions when the standard broad gauge is already available.

The adoption of CBS color television standards is contrary to the recommendations of virtually the entire television industry (R. 162-63, 560, 581, 589; Tr. 2529-30, 3896, 4849-50, 5499, 5903, 7974-76, 8095, 8199-200, 8266, 8385-86, 9397, 9495, 9696, 9866, 10046-47, 10057).

The potentialities of basic research which would make an all-electronic, high-definition, compatible color television system available to the public have not been fairly explored by the Commission. In fact, the Commission has refused even to look at many of the results of this research (R. 165-66, 408-12, 419-20, 428-31, 592-95, 871-72, 879-81; *cf.* Motion to Affirm, p. 21).

If the public interest, convenience, and necessity as set forth in the Communications Act of 1934 has any meaning whatever with respect to the adoption of commercial television broadcasting standards, and this Court has said it must have meaning, the Commission has exceeded its jurisdiction, and has contravened the public interest.

Not only has the Commission turned its back on the abundant promise and achievement of electronic science and refused even to look at its accomplishments;

Not only has the Commission retrogressed from the goal of high-quality standards which leave the fullest room for continued improvement;

The Commission has gone further, and, in an effort to accomplish a *tour de force* of administrative law, has sought to change the most compelling reason for the rejection of the CBS system—its incompatibility—into the sole reason for its adoption now. That is what the First Report and the bracket standards proposal most clearly reveal.

Unless conscience and common sense rebelled against the adoption of a ten-year old, degraded, incompatible system, which had at least once been rejected, there would have been no First Report and no proposal for bracket standards. There would have been only a final report.

Nowhere have appellees denied the validity of the principles governing standards set forth above. Nor does the Commission even claim that the adoption of the CBS system squares with those principles.

Hoped-for refuge is taken instead in the existence of a "record" and in rubrics relating to administrative finality and the limitations on judicial review.

These will be discussed below. The point appellants wish to make here is that no "record" and no refuge in the rubrics of administrative law can hide the fact that the order here under review flatly violates every principle to be found in the Act or heretofore expressed by the Commission with respect to television transmission standards.

POINT II.

The Commission's Record Is Concededly Inadequate and the Action of the Commission Is Not Supported by Substantial Evidence.

The action of the Commission in adopting the incompatible CBS system and rejecting the RCA system constitutes a clear violation of established law requiring that administrative action, findings and conclusions be based on substantial evidence.

In the instant case, it is submitted that the decision of the Commission cannot be sustained since it cannot be found on review of "the whole record" that "the evidence supporting that decision is substantial, when viewed in the light that the record in its entirety furnishes." *Universal Camera Corp.* v. *National Labor Relations Board,* 19 U. S. L. Week 4160 (U. S. Feb. 26, 1951); *National Labor Relations Board* v. *The Pittsburgh Steamship Co.,* 19 U. S. L. Week 4136 (U. S. Feb. 26, 1951).

A. Admitted Inadequacy Of Administrative Record.

This is a case in which the Commission has in its own words acted on the basis of "speculation and hope" (R. 165).

The First Report of the Commission makes it clear that this is not a case in which the Commission can claim that the record supports its order. Indeed, the Commission cannot properly claim even to have completed such a record.

The CBS incompatible color system dates back to 1940 (Tr. 8885-86). It was rejected by the Commission in 1947 for defects which it still has, as well as because it required 16 megacycles to give picture detail comparable to that provided by existing television standards.* In the present 6-megacycle channels, the CBS system has less than half the picture detail of the existing black and white standards (R. 360, 575-76, 584, 795).

The RCA compatible all-electronic color television system is relatively new (Tr. 2655-60; Exhibit 206, pp. 2-3, Exhibit 209, p. 1). This system utilizes principles of the RCA simultaneous system first demonstrated in 1946 which required 14 megacycles (Tr. 2659, 2812). The development of the RCA color system to the point where it operates in

* FCC, REPORT, March 18, 1947, 11 F. C. C. 1523.

a 6-megacycle channel, without sacrificing picture detail, took place in 1949 (Tr. 2658-60).

As successively demonstrated during the hearings, and since, the RCA system has improved in practical operation tremendously. This is conceded by all (Tr. 6130-31, 7994, 8516, 8611, 8882, 9619, 10002, 11282).

On the other hand, the CBS incompatible system has remained basically as it was in 1940 (Tr. 8885-86). A mechanical disc is still used, with its inherent limitations on picture size, rather than electronic means, to produce color (Tr. 3137, 3170-71).

In this state of affairs, the Commission issued its First Report of September 1, 1950, the taking of testimony having ended in May, 1950. In this Report, the Commission purported to evaluate both systems, *but did not adopt either.*

As indicated, the RCA system was new. Nevertheless it had solved the all-important problem of compatibility (R. 149, 573). In addition, RCA had only late in the hearings developed and demonstrated the tri-color picture tube, one of the greatest inventions in the electronics art (Tr. 7989, 7994, 8130-32, 10040, 11282; Exhibit 382).

Accordingly, the Commission, recognizing that "fundamental research cannot be performed on schedule" and that "much of the fruit of this research is only now beginning to emerge", stated in its First Report that it wished more time before freezing standards for color (R. 165-66).

As Commissioner Hennock stated (R. 192):

> ". . . it has been decided by this Commission that the most desirable course to follow would be to allow more time for the development of all color systems, including the CBS field sequential system".

This conclusion was in accord with the Commission's consistent past practice and with the mandate of the Communications Act of 1934.

In refusing to adopt television standards in 1940, the Commission stated in its Report of May 28 of that year:

> "It would be a violation of its statutory obligations for the Commission to disregard any facts which might foreclose a proper exercise of its duty to fix transmission standards. . . ." (p. 19)

This principle of administrative construction was reaffirmed by the Commission in its Report of March 18, 1947, which rejected the CBS system. The Commission then said:

> "Before approving proposed standards, the Commission must be satisfied not only that the system proposed will work, but also that the system is as good as can be expected within any reasonable time in the forseeable future." (11 F. C. C. 1523, 1525)

On the other hand, the Commission in this case also found defects in the CBS incompatible system, ten years old and at least once rejected as it was, which the Commission thought should be overcome before adoption, even assuming that an incompatible system should in any case be adopted. These limitations were susceptibility to flicker, low picture detail, and limited picture size (R. 163-65).

The Commission stated *as to all three of these limitations** that the adoption of the CBS system would mean that the Commission was

> "compelled to *speculate* as to an important basis for its decision . . ."

and that

> "the Commission's determination on an important part of its decision would be based on *speculation and hope*. . . ." (R. 165).

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* Not, as appellees' Motion to Affirm said, only as to the limitation on picture size (p. 16). See First Report, ¶¶146-47 (R. 165).

Seven performance characteristics were considered by the Commission in its First Report in evaluating the color systems proposed (R. 129, 135, 137, 140, 142, 143, 145). The Commission's Report expressly recognized in connection with the CBS system that further information was required with respect to each of these seven performance characteristics (R. 130-31, 134, 136-137, 139, 140-41, 142-43, 144, 145).

In spite of these clear statements that a decision could not properly be made without further information and further opportunity for the development of all systems, the Commission on October 10, 1950 adopted standards for the CBS incompatible system

> (1) without taking any further evidence as to the CBS system,
>
> (2) refusing to consider further information with respect to the RCA system, and
>
> (3) without according opportunity for further development.*

Thus the Commission has conceded and admitted in its First Report that the record of the hearings before it was inadequate to enable it to discharge its duties. The Commission nevertheless in its Second Report went ahead and adopted the CBS system on this same concededly inadequate record. No additional evidence whatever was taken.

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* This is to be contrasted with the Commission's action in other cases. *In re Applications of the Lake Huron Broadcasting Co. (WKNX) and WKMH*, Docket Nos. 9360 and 9568; PIKE AND FISCHER, 6 R. R. 875, 877, 878. On December 8, 1950 in that proceeding the Commission approved an order reopening the record to take further evidence so that the Commission could have

> "a sounder, more accurate and scientific basis"

for decision and so that

> "certainty can replace speculation."

In this connection the majority of the District Court said of the Commission's refusal to consider further evidence (R. 871-72):

> "Admittedly, much progress was made during the latter portion of the hearings and, as claimed, after the hearings closed, in the development of a compatible system of color television. Particularly was such progress made by RCA, and as we view the situation the most plausible contention made by plaintiffs is that the Commission abused its discretion in refusing to extend the effective date of its order so that it might further consider the situation, and particularly the improvement which it is claimed had been made by RCA and others."

In dissenting from the decision of the District Court, Judge La Buy stated (R. 881):

> "... it is difficult to understand why the Commission refused to hear additional evidence and chose instead a course of action, using its own words, based 'on speculation and hope rather than on demonstrations.'"

Furthermore, in so far as the Commission made findings based upon evidence in the record, it in many instances relied squarely upon clearly superseded evidence in reaching its result. In a situation of this kind where a dynamic science is involved, it is clear that findings which are based upon superseded evidence cannot be findings based upon substantial evidence.

As stated by the majority of the District Court:

> "... a number of critical findings [of the Commission] are based upon evidence which was taken in the earlier stage of the proceeding which is not representative of the situation as it existed at the time the findings were adopted." (R. 871)

If the court below had applied to the Commission's decision the proper standards of review which have since been enunciated by this Court, the court below could not in the words of this Court "conscientiously find that the evidence supporting that decision is substantial, when viewed in the light that the record in its entirety furnishes". *Universal Camera Corp.* v. *National Labor Relations Board*, 19 U. S. L. Week 4160 (U. S. Feb. 26, 1951).*

In fact, the Commission itself in its First Report held that the record considered in its entirety did not warrant final action. Notwithstanding that admitted inadequacy, and without considering any additional evidence whatsoever, the Commission in its Second Report went ahead and took final action adopting the CBS system exclusively.

B. Lack of Substantial Evidence To Support The Commission's findings.

1. The CBS Color Television System.

a. CBS Limitation on Picture Size.

As stated by the District Court, the Commission made five so-called "basic findings" with respect to the CBS system.**

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* In the *Universal Camera Corporation* case, this Court noted that the Seventh Circuit had followed a standard of judicial review contrary to that which this Court has now held to be proper. The three cases cited by the court below which it stated "so firmly delineated" its "scope of review" were all decided prior to the passage of the Administrative Procedure Act, the statute which has enlarged the scope of judicial review with respect to substantial evidence.

** These appear in the Opinion of the District Court (R. 869-70). They were apparently taken by the court below from the CBS Memorandum filed with that court and are not exact quotations from the Commission's Reports and order. They are, however, a fair composite of what the Commission said in its First and Second Reports.

One "basic finding" with respect to the CBS system is:

> "that while as a practical matter the apparatus now used by the CBS system is limited either to projection receivers of unlimited size or direct-view pictures of 12½ inch size, this size limitation will be eliminated if and when a commercial tri-color tube is successfully developed, and that in any event the public might well prefer a 12½ inch color picture to a 16-inch black-and-white picture and should not be deprived of that choice" (R. 870).

The reason for the limitation on the size of CBS color pictures to 12½ inches is inherent in the disc-type apparatus proposed by CBS. This is due to the fact that a disc larger than 26 inches in diameter whirling at the high speed of 1440 revolutions per minute is not considered practical (R. 150, 602; Tr. 3217-18, 3237-38, 5102, 8978-79, 9180-84, 9349-54). And the diameter of the disc must be somewhat more than twice that of the picture tube in front of which it is set up (R. 150, 602; Tr. 3217).

With respect to this CBS limitation, the Commission stated in its First Report that it should have further evidence in order to avoid acting on "speculation and hope" (R. 164-65). No such evidence was taken.

The statement that the public "might well prefer a 12½ inch color picture to a 16 inch black and white picture" is to be contrasted with the fact that 90% of the sales in black and white television receivers today are of 16 inch or larger sizes (R. 602, 870). There is no limitation on black and white pictures to 16 inches (or on RCA color pictures) and it is common knowledge that 16 inches is becoming the *minimum* size today (*cf.* Tr. 4306-07). A great volume of sales is in sizes above 16 inches.

The CBS testimony on which the Commission based the finding that a 12½ inch color picture is something that the

"public might well prefer" is very much different from the CBS position in 1944 that an 18 inch screen was

> ". . . the size most folks seem to want in their living room". (Tr. 9209)

Similarly, CBS in 1944 took the position that

> "The picture must be larger [than 7½ by 10 inches] if the television set is to provide entertainment for a whole family or for friends." (Tr. 9210-13)

A picture of 7½ by 10 inches is substantially that produced by the 12½ inch tube of today.*

Commissioner Sterling, formerly Chief Engineer of the Commission, strongly dissented from the majority of the Commission in this respect. He stated, and the record as a whole will not support a contrary conclusion (R. 429):

> "I believe that the rapid acceptance by the public of receivers incorporating larger sized black and white tubes as they moved from 7" to 10" to 12", then to 16" and 19" clearly indicates the preference of the public for large size TV pictures and they will not be satisfied with smaller pictures because they are in color."

The majority of the Commission are setting their "speculation and hope" as to the possible satisfaction of the public with midget sized television against the demonstrated preference of the public for large screen television.

It is as if the Commission had standardized on the four cylinder car when the public was almost unanimously purchasing six and eight cylinder cars.

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* Television picture sizes are now expressed in terms of the diagonal of the picture rather than by width or height.

b. CBS Susceptibility to Flicker.

Another "basic finding" with respect to the CBS system is:

> "that though the CBS system is susceptible to flicker to a greater degree than standard black-and-white, the problem is not serious since flicker, which results from brightness, does not appear at the brightness level which is adequate for home use" (R. 869-70).

It will be noted that this finding, like others, starts with an admission and an apology for the CBS system. The finding thus concedes that the CBS system is susceptible to flicker to a greater degree than standard black and white.

This susceptibility of the CBS system to flicker is another defect on which the Commission, in its First Report, said it should have further evidence as to whether and how it might be overcome (R. 163, 165). Otherwise the Commission said its decision on this point would be "based on speculation and hope" (R. 165).

It has been conceded by CBS that with its disc-type receivers the maximum brightness that can be enjoyed without flicker at the most favorable viewing distance is 18½ footlamberts (Tr. 8964).

The inadequacy of this order of brightness is indicated by a study conducted by a committee of three engineers, one of whom is now the Chief Engineer of the Commission. This committee, on the basis of a side-by-side comparison, selected as the maximum brightness useful for television the figure of 1400 footlamberts and the minimum brightness 30 footlamberts, with preferred values near the maximum. (Docket 7896; Tr. 418-19, 431-32; Exhibit 21, pp. 127-146)*

* The record in Docket No. 7896 was incorporated by reference in the proceedings here under review at the request of CBS (Tr. 2004-05).

During a demonstration before the Commission of the CBS system, Dr. Goldsmith of DuMont Laboratories stated regarding CBS color receivers operating at a brightness of only 18 footlamberts:

> "From where I am sitting, approximately 15 feet from the receiver, there is a very perceptible flicker on this picture." (Tr. 3327)

Adrian Murphy of CBS had no alternative but to agree:

> "Well, there should be." (Tr. 3327)

Dr. DuMont testified that

> ". . . you cannot get a bright enough picture without flicker in the CBS system . . ." (Tr. 9499)

Dr. Lee De Forest, the famous pioneer in electronics, also testified with respect to inadequate picture brightness in the CBS system. He stated:

> "The disadvantage of the Columbia system is it is a color subtractive, so there is an enormous loss of light as there is in any subtractive filter system." (Tr. 5897)

The significance of flicker and brightness in selecting standards was emphasized in the testimony of Mr. Fink. He stated:

> ". . . if the . . . [British] public could see how much brighter the American television pictures are, because they are 60 fields per second and not 50 fields per second* . . . they might not be so satisfied with the decision which the Government of Britain made in 1936, and I think that *it is important for a*

* The CBS system has the equivalent of even less than 50. It has 48 fields per second (R. 132, 585).

commission not to take what the public is willing to accept, but what the public would like to accept if it knew the alternatives." (Tr. 7977-78)

Mr. Fink pointed out how fortunate we were in having adopted American standards for black and white television which put a high ceiling on brightness. He stated:

"We did not know that we were going to have pictures as bright as we now find the public actually demands." (Tr. 7981)

Flicker is a problem of fundamental engineering limitations in the CBS system (R. 360-61, 585-86; Tr. 4037, 5088, 5618). In the hearing this point was clearly made by the Motorola company, a large television receiver manufacturer:

"The CBS system is faced with a continuous compromise between flicker and definition and the requirements for an acceptable system cannot be achieved within the limitations of a 6 Mc. bandwidth and compatibility.

• • • • • •

"Motorola, Inc. maintains a television research laboratory under the direction of Dr. Kurt Schlesinger and active projects include several confidential programs looking toward the solution of color receiver problems. Dr. Kurt Schlesinger has a background of four years of direct engineering work with the CBS color system. A careful weighing of this and of all other Motorola experience and Institutional knowledge of color television has led to the considered decision that *the CBS system is unsatisfactory and unworthy of additional time and attention.*" (Exhibit 384, p. 5)

The great importance of the susceptibility to flicker of the CBS system is shown by the Commission's Report at

the conclusion of the 1946-1947 color hearings. At that time the Commission held:

> "In the absence of more convincing evidence on the point, the Commission is of the opinion that on the point of brightness and flicker alone, the risk of approving the Columbia standards at this time is that color television might be forced to limp along with a picture that is not sufficiently bright for general home use or is subject to objectionable flicker." (11 F.C.C. 1523, 1531)

The brightness and flicker characteristics of the CBS system which the Commission has adopted by its order are precisely the same as those of the CBS system which the Commission rejected in 1947 (R. 585-86).

It was then admitted by CBS's own expert on optics and vision, that if the effective field rate of the CBS system could have been changed to the field rate employed by the present black and white system and by the RCA color system as well, the amount of brightness which could be enjoyed without flicker could be increased by about ten times (Docket 7896, Tr. 1532).

c. CBS Picture Quality and System Equipment.

Two of the "basic findings" relate to the nature of the CBS color picture and to the CBS system equipment (R. 869).

The all-important point in respect of both of these findings is that they relate only to CBS mechanical disc apparatus. They are thus confined to apparatus which the Commission itself found was limited to direct-view picture size of 12½ inches.

The record clearly establishes the unsatisfactory nature of this type of equipment.

Dr. Charles W. Geer, Professor of Physics at the University of Southern California, testified that color receivers

> "... should not be dependent upon mechanical means of color separation or synthesis, nor upon synchronous motors, nor upon filters ..." (Tr. 3833).

Mr. S. B. Smith, testifying on behalf of CTI, stated (Tr. 4095-96):

> "In the public interest the standards established should, and must, in my opinion, exclude all but a purely electronic operation. After all, we, in the United States, are long past the so-called mechanical age. We are well along in the electronic age. We are entering the atomic age.
>
> "If this Commission goes backward and authorizes a color television system wherein a rotary disc is used as the color controlling element, it would be like reverting, in my opinion, to a Nipkow disc originating in 1884 as the image resolving element of a 1950 black and white television receiver."

Commissioner Sterling stated to a CBS witness (Tr. 6421):

> "Dr. Dunlap, I shall be very frank in stating that I am very much concerned about public acceptance of a color television system which requires a mechanical or motor driven color filter, because I have seen television, lived with it, and seen it emerge from a mechanical system to an all-electronic system."

Mr. Frank H. McIntosh, an independent consulting engineer testifying on behalf of CTI, stated (Tr. 4754):

> "... the use of a rotating disc does entail certain unavoidable disadvantages. Among these are its size, its lower resistance to flicker even at the higher field rate of the CBS system, and its inherent tendency to cause color breakup and color fringing. In

addition, there is the fundamental limitation on the size of image which can be used, a factor which necessitates the use of a magnifier with its resultant limiting viewing angle and susceptibility to specular reflections. The trend is toward larger and larger television pictures, and an upper limit of ten or twelve inches can only serve to impede the progress of the art . . . ".

That the CBS equipment is not simple to handle and to operate either from the standpoint of reception or transmission is clear.

Thus, with a CBS disc-type adapted and converted color receiver, the viewer must perform a series of operations whenever the broadcaster switches from standard black and white to CBS color. These operations are:

1. The viewer must leave his seat and walk over to the receiver;
2. The viewer must push a button or flip a switch to shift from 525 line 60 field transmission to 405 line 144 field transmission;
3. The viewer must push another button or flip another switch in order to turn on the motor to drive the disc;
4. The viewer must wait until the color wheel has reached 1440 revolutions per minute, an amount of time which will vary with the size of the motor and the size of the wheel in his particular set;
5. The viewer must use the phasing button to lock the colors in their proper sequence; and finally
6. The viewer may return to his chair and then look at the program.

These facts were finally recognized by Dr. Stanton, President of CBS, after prolonged cross-examination (Tr. 8658-71; *cf.* 8978-79, 9349-54).

d. CBS "Geometric Resolution." (Lack of Picture Detail)

Another "basic finding" with respect to the CBS system is:

> "that while the CBS system has less 'geometric resolution' than black-and-white, the addition of color more than outweighs this loss, and that the black-and-white pictures produced from CBS color are acceptable" (R. 870).

This finding admits the CBS system has less resolution or picture elements than black and white, but says color makes up for this.

Actually CBS color has about 80,000 picture elements compared with 200,000 for standard black and white (R. 360, 575-76; Tr. 5328). *RCA color also has 200,000 picture elements* (R. 367, 584). These figures eloquently tell the story of why the Commission, in its First Report, said it wanted further evidence on whether and, if so, how this deficiency in the CBS system could be overcome. But no such evidence was taken. And the defect was not overcome.

It is claimed that this deficiency in picture elements is balanced out by the addition of color. But only a color system in which color is a *plus* factor rather than a balancing factor can satisfy the Commission's obligation to promote "the *larger* and *more effective* use of radio in the public interest".*

As Mr. McIntosh, a consulting engineer retained by CTI, testified:

> "Such a subjective improvement in apparent resolution, however, can scarcely be used as an excuse to degrade basic picture quality any more than is necessary. The radio frequency spectrum is one of our greatest natural resources and any system

* Section 303(g) of the Communications Act.

> that unavoidably cuts its utilization in half, or more, represents a distinct waste and should certainly be avoided if at all possible." (Tr. 4743-44)

This is in accord with the position of Dr. Goldmark of CBS in the past that picture detail is as important in a color system as in a black and white television system. Dr. Goldmark, as chairman of an industry sub-committee, signed a report in 1946 stating that (Tr. 8894-95):

> "The sub-committee felt that a color television system should have the same resolution as a black and white system."

Dr. Goldmark's own observations on the record in this hearing attest to the importance of resolution or picture detail in a color system as well as in a black and white system. During the November, 1949 comparative demonstration before the Commission, Dr. Goldmark, at a viewing distance of more than 20 times picture height from the RCA color receiver was able to read finer print than he was able to read on the CBS color receiver from a distance of approximately 12 times picture height (Tr. 5945-46). Dr. Goldmark's experience in this regard was at that time confirmed by the experience of Dr. DuMont (Tr. 5946).

The effect of the decrease in picture detail on the black and white picture produced by CBS color transmissions was succinctly stated by Dr. DuMont:

> " . . . I just cannot see how you could possibly consider the Columbia system for the poor black and white picture that you get, and the relatively inferior picture that you get with the Columbia system." (Tr. 9413-14)

A sacrifice of more than half the picture detail in the present black and white picture is part of the "price" which

would be paid by the public for this incompatible CBS color system. A comparable degradation, by administrative fiat, of 60% in an important performance characteristic—either in the quality of voice transmission over telephones or in the performance of one's automobile—gives some basis for comparison of the tremendous sacrifice the public would be called upon to make by this order.

All this is even more sharply brought to consciousness by the further fact that in order to get even this inferior and degraded black and white picture from the CBS color transmissions, it would be necessary for each and every owner of a set to pay at least $50 for an adapter (R. 147-48, 602, 876).

2. The RCA Color Television System.

The "basic findings" of the Commission with respect to the RCA system, as set forth in the opinion of the District Court, are discussed below.*

a. RCA Color Fidelity.

The first "basic finding" is (R. 868):

> "that the color fidelity of the RCA picture is not satisfactory and that there appears to be no reasonable prospect that the defects can be overcome."

In this finding, as in other of the basic findings with respect to the RCA system, there is an intermingling of past and future. The RCA system was not rejected as to color fidelity because it was not satisfactory. It was rejected because it was allegedly not satisfactory "*and* . . .

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* These "basic findings", like those relating to the CBS system, appear in the Opinion of the District Court (R. 868-69). They were apparently taken by the court below from the CBS Memorandum filed in that court and are not exact quotations from the Commission's Reports and order. They are, however, a fair composite of what the Commission said in its First and Second Reports.

there appears to be no reasonable prospect that the defects can be overcome." Thus, the finding is unsupported if it falls on either ground—past or future.

Great progress was made by RCA between its early demonstrations in the fall of 1949 and the close of the testimony before the Commission in May, 1950 (R. 871-72, 881).

This was attested to even by CBS' witnesses. Thus, Dr. D. B. Judd of the National Bureau of Standards was called by CBS as its expert on color fidelity. Dr. Judd had not been impressed with the color fidelity on the RCA laboratory sets he saw in the early stages of the hearing. But when he returned to the stand in April, 1950 he said in respect of color fidelity that "One of the best demonstrations by the RCA system" occurred on a receiver which was brought to the Bureau of Standards in connection with tests of color television systems (Tr. 9314). He added:

> "The show that I saw then . ... was the equal of any of the CBS shows on color fidelity". (Tr. 9314)

The comments of various members of the Commission are also informative with respect to the color fidelity of the RCA system.

The Acting Chairman of the Commission stated to an RCA witness, on the record on April 11, 1950, that:

> ". . . your picture is greatly improved since your first showing". (Tr. 8516)

Another Commissioner commented on March 16, 1950:

> ". . . we have seen that [the RCA system], and it produced beautiful color". (Tr. 6900)

The same Commissioner also stated on February 27, 1950:

> "I noticed the marked improvement in your color the other morning at Laurel, and I think we all did,

> and I was completely surprised by the lifelike reproduction, particularly in the final RCA picture, where the man inserted flowers in that shallow dish." (Tr. 6130-31)

The fundamental fact regarding color fidelity of the RCA and other systems presented to the Commission was stated by the Condon Committee:

> "There is . . . no basic difference in the color fidelity of the three color systems." (R. 362)

The Commission was advised of this fact the very first day of the hearings in September, 1949. Mr. Donald Fink, a leading electronics engineer and a member of the Condon Committee, testified (Tr. 2014):

> "All systems considered are believed to have the same capabilities in this respect [color fidelity]."

Mr. Donald K. Lippincott, an independent expert testifying on behalf of CTI, stated (Tr. 4594):

> "... there is every reason to believe that the color fidelity would be the same in all of the systems."

To the extent that the record indicates that there may be a difference between the color systems in respect of the ultimate color fidelity attainable, the difference is in favor of RCA. Thus, Dr. Goldsmith, of DuMont Laboratories, testified:

> "Theoretically the RCA type system . . . can probably give the highest color fidelity of any of the systems." (Tr. 9926)

Furthermore, the Condon Committee reported that tests conducted by the Bureau of Standards showed that

> "In February 1950 the RCA system of television in color was found to yield substantially as faithful

> reproductions in color as is common by Kodachrome photographs." (R. 396)

In the face of this evidence, the Commission has gone so far as to refer to the RCA system in oral argument in the court below as

> "... a system which will give some kind of splotches of color in a laboratory ..." (Tr. of Proc. 240).

The fallaciousness of the so-called "basic finding" with respect to the color fidelity of the RCA system is further proved by the coupled assertion that

> "there appears to be no reasonable prospect that the defects can be overcome".

This finding reflects testimony by CBS. However, CBS witnesses themselves later admitted on cross-examination that they were wrong.

For example, on October 11, 1949, Dr. Goldmark of CBS, testified in response to a question by Commissioner Hennock (Tr. 3585):

> "Commissioner Hennock: Do you mean to say that nothing can improve the R. C. A. system?
> "The Witness: No, nothing, I think."

On the same day, Dr. Goldmark also testified that the RCA system was not even worth field testing (Tr. 3585), and that "there is grave doubt that it will ever emerge from the laboratory" (Tr. 3566).

In contrast, on April 18, 1950 Dr. Goldmark admitted on cross-examination that the RCA color picture had improved a "thousand percent" (Tr. 8882-83).

The fact of "substantial improvement" in the RCA color picture was also admitted on April 17, 1950 by the President of CBS on cross-examination (Tr. 8609-12).

It is of interest to compare the "grave doubt" that the RCA color television system would "ever emerge from the laboratory" with what actually happened.

Beginning January 9, 1950, RCA color transmissions went on the air over Station WNBW in Washington, D. C. and continued regularly for more than nine months. (Tr. 6051, 6107-8, 7227; Exhibits 427, 429, 430). These broadcasts were substantially identical with normal commercial operations (Tr. 7227).

In this connection, an interesting variation of the CBS testimony that "nothing can improve the RCA . . . system" is that it would take a long time before the RCA system would be ready. Thus, on February 28, 1950, Adrian Murphy, of CBS, was being questioned by Commissioner Hennock with respect to cost estimates for RCA receiving sets. This exchange then occurred (Tr. 6211):

> "Commissioner Hennock: Don't you think they [RCA] are waiting for that direct tube? . . .
>
> "The Witness: I think they may have a *long wait* . . ."

Twenty-four days later RCA demonstrated the RCA tricolor tube to the Commission and staff (Tr. 7475).

The position of the Commission and CBS, as set forth in their Motion to Affirm (p. 18), that the RCA system is "inherently deficient and incapable of producing satisfactory color pictures" cannot find support on the basis of the whole record.

Outmoded and superseded testimony is not substantial evidence.

Furthermore, in its Progress Report of July 31, 1950, RCA invited the Commission to see for itself the improvements which had been made. These matters the Commission refused to consider.

On October 4, 1950 RCA formally petitioned the Commission to review "the improvements made in the performance of the RCA system, with particular reference to those points about which the Commission expressed doubts" (R. 408-09). This petition was denied (R. 410-12).

It is submitted that when the record as a whole is reviewed, there is no substantial support for the finding of the Commission with respect to the color fidelity of the RCA system.

b. RCA Picture Texture.

The second "basic finding" is (R. 868-69):

> "that the texture of the RCA color picture is not satisfactory and that it is difficult to see how this defect can be eliminated."

Again it is important to note the interdependence of past and future. The RCA system was not rejected because its picture texture was not satisfactory. It was rejected because it was allegedly not satisfactory "*and* . . . it is difficult to see how this defect can be eliminated".

The statement is disproved by the quotations from the record set forth above with respect to color fidelity.

In addition, on the specific point of picture texture, one Commissioner also said that

> "There was something very lifelike about your exhibit, that floral exhibit, and I could almost—I got a feeling of *texture* of flowers . . ." (Tr. 6139)

As Dr. Brown of RCA testified, with appropriate apparatus for the RCA system

> ". . . you see no semblance of the dot structure . . ." (Tr. 7745)

Dr. Brown further testified with respect to

> ". . . this little circuit, no tubes, simply four coils, four condensers, . . ."

the use of which results in

> ". . . taking the dots out of the picture." (Tr. 10751-52; Exhibits 209, Fig. 7; 305)

With respect to the future of RCA picture texture, even Chapin the Commission engineer testified:

> "I suspect that there are methods in which the dots may be very much reduced so far as seeing the dots in the picture is concerned. . . . But I think, so far as the dots merely that the viewer sees in the picture, you can make a substantial reduction in that dot structure and maybe get it so that you won't notice it." (Tr. 10656)

The Commission, by the RCA Progress Report of July 31, 1950, was advised that any deficiencies in this respect had been overcome. In that Report it was stated (R. 400):

> "The elimination of dot structure and moire pattern is due to the use of improved circuits in the receivers which make better use of by-passed 'mixed highs'."

As in the case of color fidelity, we submit that no such "basic finding" can find support in this record.

c. RCA Receiving Equipment

The third "basic finding" is (R. 869):

> "that the receiving equipment utilized by the RCA system is exceedingly complex and that there is no assurance, even if the tri-color tube is successfully developed, that the RCA receivers will not continue to be unduly complex and difficult to operate".

Here is the same interdependence of past and future, neither aspect of which is supported by the record.

The testimony of Mr. Donald Fink, an independent expert and a member of the Condon Committee, with respect

to the relationship of alleged apparatus simplicity to transmission standards is of interest. He stated:

> "The attitude of the public five and ten years from now with respect to what they then have in a color television system . . . is a very important matter, and rather than choose the wrong system, *because of some real or fancied simplicity that is advanced,* I would like to see the system which will be welcomed by the whole mass of the American people when we have twenty or thirty or forty million television receivers ten years from now, the system they really want, not something that we made a mistake picking in 1950." (Tr. 7974-75)

Mr. Fink had commented in 1949 on the complexity of the RCA equipment. In April, 1950, after the RCA tri-color tube had been shown, he testified on the record that the complexity to which he had referred had been eliminated with the introduction of receivers using that tube (Tr. 7966-67). He further testified that, with the RCA tri-color tube, the RCA system has, from the standpoint of simplicity, a bit of an edge over CBS disc apparatus since it does not involve movable parts; and that, in any event it is now

> " . . a stand-off so far as complexity goes as far as the two are concerned". (Tr. 7967)

Even Chapin, the Commission's staff engineer with an interest in the adoption of the CBS system, admitted (on cross-examination) that on the question of complexity there is not "much significant difference" between RCA and CBS (Tr. 10632).

Dr. Goldmark of CBS admitted with respect to the RCA system on cross-examination (Tr. 8881):

"There was improvement in simplicity of equipment, that is correct."

The issue of receiver complexity is, in a very realistic sense, reflected in receiver costs. If a receiver is complex, that complexity is bound to be reflected in a higher price. On this basis, the testimony of Dr. DuMont, and that of Mr. D. B. Smith, a Vice President of Philco Corporation, is pertinent. After the RCA tri-color tube (which greatly simplified RCA color receivers) was demonstrated, Dr. DuMont testified that the cost of making a set for RCA

"... would probably be less than the making of the Columbia [disc] set ..." (Tr. 9392)

He stated:

"I think it [CBS equipment] is probably a little more complex than ... RCA." (Tr. 9391)

Mr. Smith testified that

"... I have a very strong conviction that the cheapest way ... to build a color receiver is to use a direct-view type of color tube and a dot sequential [i.e., RCA] ... standard". (Tr. 9201)

Dr. Baker, the head of the Electronics Division of the General Electric Company, testified in respect of the RCA tri-color tube, which is the heart of the RCA receiver, that

"... It is certainly a beautiful development ..." (Tr. 9711)

Dr. DuMont characterized the tube as one of the significant developments in the television field (Tr. 9456).

Dr. DuMont also testified that

"... I mentioned the dot sequential [RCA system] because I think, on the basis of what has been shown,

and the potentialities, that that probably is the best bet . . ." (Tr. 9495)

Mr. Fink testified:

"I would have said on a stack of Bibles that the tri-color tube was impossible". (Tr. 7994)

Dr. Baker of General Electric further testified that

"As to the RCA system itself, I think it is an elegant piece of work". (Tr. 9619)

Hazeltine Research Corporation outlined the extensive research it has conducted in television, including its work in color. It said that it was the considered opinion of Hazeltine engineers that

"The fundamentals of the RCA system present at this time the most attractive approach to a solution of the problem". (Exhibit 384)

Even Dr. Goldmark of CBS admitted, on cross-examination, that the RCA tri-color tube

". . . was an admirable accomplishment . . ." (Tr. 11282)

These statements are not stale testimony. They do not relate to the early part of the hearing which was superseded by new developments, including the RCA tri-color tube.*

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* With reference to the improved apparatus shown by RCA during the course of the hearings before the Commission, it is of interest to note the about-face made by CBS's principal technical witness, Dr. Goldmark. On October 17, 1949, before RCA had developed its simplified tri-color tube receivers, he testified (Tr. 3998):

". . . differentiation between system and apparatus is absolutely unpractical and unrealistic . . ."

On May 10, 1950, after RCA had developed its tri-color tube receivers, Dr. Goldmark stated as a "criticism of RCA" (Tr. 11274):

". . . they do not differentiate between system and apparatus . . ."

In a case of this character, concerned as it is with a highly technical and rapidly developing art, it is the latest facts which are important. For the Commission to cite, as supporting a finding, evidence that is obsolete, is the equivalent of making a finding which is not supported by substantial evidence in any realistic or legal sense.

d. RCA Transmitting Equipment.

The forth "basic finding" is (R. 869):

> "that the equipment which RCA utilizes at the transmitting station is exceedingly complex and there is no assurance that satisfactory commercial type station equipment can be built".

This too covers both past and the future.

The facts are that, as shown by the record, the RCA system has been operated for more than 800 hours by regular NBC studio personnel whose background and training was ordinary black and white television operation (Tr. 6051, 6102, 6107-08, 7227; Exhibit 427). There is simply no evidence in the record to show that RCA color transmitting equipment raised any problems of complexity in actual operation.

Dr. Goldsmith of DuMont Laboratories testified that in actual operation the RCA people had ". . . done a wonderful job . . ." with their color camera (Tr. 9954).

RCA's position with respect to its color studio apparatus was stated by the Chairman of its Board, Brigadier General David Sarnoff, when he testified before the Commission on May 4, 1950 that RCA was

> ". . . ready to take orders for that type of apparatus." (Tr. 10445)

As for the finding of "no assurance" for the future, among the other RCA improvements the Commission was

asked to but refused to see were improvements relating to transmitting apparatus (R. 402-03, 408-09).

The facts are that the costs of studio equipment are relatively minor in the economics of broadcasting. The President of CBS himself recognized this when he testified before the Commission. He stated that even if the broadcaster's equipment costs were high under the RCA system

> ". . . I do think the basic problem is one of circulation [i.e., number of receivers], and it would be easier for the broadcaster to cope with that problem [the economic impact of color television] under the compatible system". (Tr. 8781)

And Dr. Goldmark of CBS testified:

> "We agree, CBS agrees, that other things being equal, reasonably increased station operation costs are not decisive in this operation". (Tr. 11232)

e. RCA Alleged Susceptibility to Interference.

The fifth "basic finding" is (R. 869):

> "that the RCA system is much more susceptible to certain kinds of interference than standard black-and-white or the CBS color system".

The kind of interference referred to is that *to* television receivers by other electronic devices. It is not the kind of interference which the Commission was created to regulate—that is, interference by broadcasters with each other. Indeed, the Commission has expressly found that broadcasts of the RCA color system create no more electrical interference than the broadcasts of any other television system (R. 145).

It was the undisputed testimony that the problem of interference of the kind principally discussed in this connection is not peculiar to color television (Tr. 6264, 10692, 10715). It can be and is being eliminated as a matter of receiver design (Tr. 10715-16).

There is no evidence in the record that this alleged susceptibility has ever served as other than a theoretical objection to the RCA system. The Chief Radio Engineer of CBS confirmed this during the hearing when he testified that such interference was of "secondary importance" (Tr. 9175).

f. RCA Network Transmission.

The sixth "basic finding" is (R. 869):

> "that there is not adequate assurance of RCA's ability to network color of proper quality over existing facilities".

This is one of the most clearly erroneous of the "basic findings" and again illustrates the Commission's improper reliance on superseded evidence.

The facts are that on April 6, 1950, Dr. Engstrom of RCA testified that the RCA color system had in fact been networked over the 2.7 megacycle coaxial cable in color (Tr. 8142, 8162). On the day of the official demonstration to the Commission, the coaxial cables in Washington were in use. As the record shows, on that morning the testimony of Owen Lattimore before a Congressional Committee was being carried both by the NBC and the CBS television networks and there was no coaxial cable available for the demonstration (Tr. 8141, 8162). As a result, the narrow frequency channel characteristics of the coaxial cable were simulated by simple means well known to electronics engineers (Tr. 8141-42).

Dr. Engstrom was never contradicted nor cross-examined as to his statement that the RCA color system had successfully been networked over 2.7 megacycle coaxial cable in color.

Although testimony was taken for almost two months thereafter, no question was raised by the Commission or by anyone else as to the ability of RCA to network its system in color satisfactorily over 2.7 megacycle coaxial cables.

It is true that earlier volumes of the transcript contain evidence, and evidence by RCA witnesses, as to the difficulties which might be expected in attempting to transmit this high-definition color television system over the 2.7 megacycle cable. But the significant fact, disregarded by the Commission, is that late in the hearings this was accomplished.

Furthermore, the record establishes that there was no criticism of the quality of the RCA color transmission over the coaxial cable. Indeed, on April 11, 1950, five days after the demonstration, Commissioner Jones made the following observation on the record to Dr. Brown of RCA:

> "Commissioner Jones: Well, now, so far as the reaction of the group was concerned, the group that was there, parties and their counsel and engineers and so forth, connected with this hearing, nobody expressed any dissatisfaction with the 2.4 picture, the one that was confined. I don't mean at the receiver or transmitter now, the conditions of the coaxial cable.
>
> "The Witness: No, they did not express any opinions at all for the record from the crowd there that day.
>
> "Commissioner Jones: It would appear likely, however, that if the picture was so degraded that there was not any pleasure or pleasing value in it or enjoyment value in it, that they would have complained . . ." (Tr. 8533-34)

Furthermore, the record shows that the RCA picture when transmitted over the 2.7 megacycle cable would be far superior to the CBS picture when transmitted under similar conditions. In these circumstances the CBS system would be limited to 117 line horizontal resolution whereas the RCA system has 180 to 200 line horizontal resolution. (Tr. 5719, 8536)

g. RCA Field Testing.

The seventh "basic finding" is (R. 869):

> "that the RCA system has not been sufficiently field tested".

The facts are that the record is replete with testimony and exhibits with respect to the extensive field tests made of the RCA system. The record shows that the RCA color system has been sufficiently and successfully tested (Tr. 6107-09; Exhibits 303, 311, 312, 368, 369, 441, 444, 449). Among other evidence in the record on this point is the fact that RCA color transmissions were on the air with regularly scheduled programs from January, 1950 down to the date of the Commission's order (Tr. 6051, 6107-08, 7227; Exhibits 427, 429, 439).

These transmissions were broadcast at a time when there was substantial audience response to them, by virtue of the compatible nature of the RCA system. Thousands of persons tuned in on these broadcasts and their comments and responses are set forth in Exhibits 364-367 of the record.

The comments of the public set forth in those exhibits constitute the best refutation to this finding.

C. The Record As a Whole Does Not Support the Criteria Chosen by the Commission.

The adoption of the CBS system was premised upon certain criteria which the Commission formulated for the first time after the hearings had ended (R. 155-56). It is apparent from the omissions from these criteria that the ones selected were tailored to fit the CBS system and to make possible the adoption of that system.

There is no support in the record for the omission of other and more important criteria which would have precluded the adoption of the CBS system. Indeed, the evidence establishes the paramount importance of these omitted criteria.

1. Compatibility.

Thus, the Commission failed to include in its post-hearing criteria the all-important quality of compatibility. The Commission thereby directly contradicted the conditions or criteria which it had set in its notice of July 11, 1949 instituting the proceedings. It was there expressly directed that changes in transmission standards "looking toward color television or other television systems" would be considered "only upon a showing in these proceedings that" (R. 25-26):

> "1. Such system can operate in a 6-megacycle channel; and
>
> "2. Existing television receivers designed to receive television programs transmitted in accordance with present transmission standards will be able to receive television programs transmitted in accordance with the proposed new standards simply by making relatively minor modifications in such existing receivers."

Referring to language similar to that of the above notice, Commissioner Webster in testifying before the Senate Interstate and Foreign Commerce Committee in July, 1949 stated:

> "This was very clear and I spent a good deal of time wording it, and I insisted on some of the wording, and so did Mr. Sterling, and compatibility was our objective".*

Commissioner Webster also stated the same day:

> "Now I want to make this clear: If they set up a color television transmitter, what we insist, or what our proposal is, is that you on your present receiver today be able to receive that black and white picture or that color without any change, you see. The present receiver can receive black and white. We want it so that that color transmitter, when it transmits, you can receive on your present receiver without any change at all; you can receive black and white. *That can be done.*"**

Furthermore, the importance of compatibility to the public and to the development of color television was conceded by all parties at the hearings—even by CBS. As Frank Stanton, President of CBS, stated on the stand on March 22, 1950, CBS would "love to have compatibility" (Tr. 7177). However, with the standards adopted by the Commission compatibility is impossible.

Joseph H. McConnell, the President of NBC, testified on March 22, 1950 that (Tr. 7229-30):

> ". . . Of course, all black and white sets served by any transmitter, no matter how interconnected, can

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* *Hearings before the Senate Committee on Interstate and Foreign Commerce*, 81st Cong., 1st Sess. (1949), on the nomination of E. M. Webster to the Federal Communications Commission, p. 21.

** *Id.* at p. 20.

receive these [RCA] color transmissions as black and white programs. This is the importance of a compatible system.

"In fact, should the Commission authorize only a non-compatible color system, we would not be able to embark on any comparable color program.

"During the time the broadcaster put on non-compatible color programs he would lose his entire circulation, except to those persons who had bought adapters, converters or new color receivers. The effect of this on the broadcaster's revenue is obvious. With a non-compatible system, he could not afford choice time for color programs unless he were willing either to sacrifice his large black and white audience or this Commission would authorize him to use two frequencies, one for color and the other for black and white. I do not believe that most station owners could afford the former or that it is realistic to consider the latter. I feel that, as a result, most color programs, under a non-compatible system, would be broadcast in fringe time.

"In addition, the selection of color programs under a non-compatible system would be considerably limited. The small audience would necessarily discourage the broadcaster—as well as the sponsor—from broadcasting his choice programs in color. This lack of select programs in choice time would discourage the public from converting their present black and white receivers for color and from buying new color receivers.

"Telecasters have suffered considerable losses because of the relatively small number of receivers in the hands of the public during the early years. Although this situation has begun to correct itself in black and white television because of the tremendous public acceptance of the new medium, the adoption of a non-compatible color system would extend the period of station losses. It has taken four years of

these losses to build up the black and white television audience to the size it is today. It would take a long time to build up as great an audience for a non-compatible color system."

Testifying further with respect to the importance of compatibility to the development of color television as a broadcasting service, the President of NBC stated (Tr. 7230-31):

> "In my opinion, the adoption by the Commission of a non-compatible color system would be a major factor in delaying the coming of a sound color service on a national basis. I am strongly in favor of such a service. But I do not believe it will be possible for any broadcasters to furnish such a service for a long time if a non-compatible system should be adopted by the Commission.
>
> "With more than five million black and white receivers in the hands of the public, and I think that is the correct figure now, the transition period to the time when an equivalent number of receivers capable of receiving color broadcasts are in the hands of the public would in my opinion be a long one.
>
> "On the other hand, with the RCA system, color broadcasts of outstanding programs in choice viewing time can become an immediate reality without any loss of present service to the broadcaster or to the public. I believe that if the Commission should standardize on this system, it would provide the greatest force to stimulate the growth of color television."

As noted above, the President of CBS also stressed the importance of compatibility. When questioned on October 4, 1949 as to why CBS would not broadcast its color programs in choice time, he stated (Tr. 2983):

> "For the obvious point . . . that at the outset we wouldn't be dealing with the same circulation. Let's face it."*

Adrian Murphy, a CBS vice-president, said CBS would "welcome compatibility" (Tr. 6254).

And every other witness who discussed compatibility, including Dr. DeForest (Tr. 5903), Dr. Geer (Tr. 3896), Fink (Tr. 8015-16, 8027), Dr. Baker (Tr. 9696, 9866), Smith (Tr. 4849-50, 4857-60), Dr. DuMont (Tr. 9374, 9400), Dr. Goldsmith (Tr. 5461-62, 10002-03) and General Sarnoff (Tr. 10057, 10102, 10529-30), testified to its paramount importance.

As stated by Judge La Buy in his dissenting opinion in the court below (R. 879):

> "It is conceded by all and it is self-evident that the best system of color television is a compatible one; that is, a system requiring no change whatever in existing receivers for the reception of black and white as well as color pictures. Indeed, compatibility is the coveted goal of all engineers and scientists engaged in the television industry."

The standards proposed by CBS have been adopted although it has been impossible to make the CBS system compatible. On the other hand, compatibility has been achieved. The Commission found, and the appellees concede, that the RCA color system is compatible (Motion to Affirm, p. 7).

An incompatible system is, therefore, nothing more or less than an unready system. Incompatibility is a basic defect in a color system. It is a problem for the research

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* At that time there were less than 3,000,000 television receivers in the hands of the public as compared with approximately 12,000,000 today.

laboratory. The cost of achieving compatibility should be borne by the developer of a color system. It should not be passed on to the public—as the Commission has done in this case.

2. Resolution (Picture Detail).

The Commission's criteria omit therefrom, contrary to the almost unanimous views of the experts who testified before the Commission, any requirement that the resolution afforded by a color system be of high quality (R. 155-56).*

The importance of resolution, the technical term for picture detail, is indicated by the fact that the first four of the performance characteristics which the Condon Committee stated were "of paramount importance in comparing color television systems" were Resolution, the Flicker-Brightness Relationship, Continuity of Motion, and Effectiveness of Channel Utilization (R. 353). As will be shown, the Commission's Reports either ignored or sought to minimize the advantages of the RCA system over the CBS system in respect of three of these four essential performance characteristics.**

As the Condon Committee stated with respect to resolution (R. 344):

> "The technical term for pictorial detail is 'resolution,' because this . . . represents the ability of the television image to resolve the fine details of the scenes it depicts. As we have seen, resolution is measured by the total number of equivalent halftone dots in the image."

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* The Commission restricted itself to "adequate apparent definition" (R. 155).

** The difference between the RCA and CBS systems with respect to Continuity of Motion, the third performance characteristic considered by the Condon Committee, is relatively slight.

In the past, the Commission recognized the importance of picture detail. In its May 28, 1940 Report, for example, the Commission stated:

> "Two of the important television problems outstanding are to develop (a) a better picture with more detail and greater clarity and (b) a larger picture." (p. 9)

Referring to the adoption by the Commission in May, 1941 of commercial standards for black and white television, the Condon Committee stated (R. 342):

> "Faced by this conflict between quality (pictorial detail) on the one hand, and quantity (number of stations and choice of programs) on the other, the Federal Communications Commission in 1941 adopted for public television broadcasting a black-and-white system having about the equivalent of 200,000 half-tone dots in the picture area. This choice appears to have merit . . ."

The Committee further stated (R. 343):

> "Experience with the 525-line black-and-white system since 1941 has shown that it provides an adequate basis for a public television service, so far as pictorial detail is concerned. But this is not to imply that additional detail would not be desirable if it were available without excessively reducing the quantity of service."

Some time prior to the commencement of the color television proceedings, the Chairman of the Commission, in a speech before the National Association of Broadcasters on April 11, 1949, acknowledged the detrimental effect of a lowering of standards:

> "A concerted lowering of standards would be calamitous to the whole field of broadcasting, could

lead to . . . television [becoming] the national eyesore.'"*

The importance of setting high standards with respect to resolution was emphasized during the hearings before the Commission. Thus, David B. Smith of Philco stated:

". . . the [CBS] standards don't provide a high enough quality service." (Tr. 4949)

Dr. DuMont testified:

". . . the CBS proposals . . . will not permit a picture with sufficient geometric resolution, of sufficient size or with sufficient brilliance without flicker." (Tr. 5555)

He stated further:

"I think you need just as much definition as you can possibly get. You cannot get too much of it." (Tr. 9502)

Donald K. Lippincott, testifying on behalf of CTI, stated:

"My objection to standards for the CBS system at the present time is that it would result in adopting as standards and freezing on the industry a picture which admittedly has 45 [*sic*] percent less definition." (Tr. 6503)

Dr. T. T. Goldsmith's requirement for a satisfactory color television system was that it should solve the problem of

"getting high definition color into a 6 megacycle channel." (Tr. 5499)

* FCC Release No. 35013.

He also testified:

> "The lack of definition is serious and is a basic limitation of the [CBS] system." (Tr. 5134)

Even Dr. Stanton of CBS spoke of a "reduction in performance" and the "loss of geometrical resolution" in the CBS system (Tr. 2991-93).

The importance of resolution or definition in television programming was formerly frankly recognized by CBS. Thus in an application to the Commission in 1944, CBS recognized that poor resolution would "curtail flexibility and the techniques of pick-up in order to achieve simple recognizability of objects and persons" (Tr. 9346).

Adrian Murphy of CBS admitted that degraded resolution limits flexibility in this respect (Tr. 9347).

Indeed, CBS formerly took the position that even the present 525 line standards did not provide sufficient definition.

Thus Dr. Goldmark of CBS testifying in 1944 before the Commission stated:

> "We feel certain that to ensure continued public acceptance . . . the definition of prewar pictures . . . must be increased. . . . we propose . . . black-and-white at 735 lines per picture . . . color with 525 lines".*

Paul Kesten, then Executive Vice President of CBS, stated in 1944:

> ". . . [the 525 line standards] are simply not good enough to put television over as a real public service or even as a going enterprise." (Tr. 8621)

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* FCC Docket No. 6651, p. 1874. The record in Docket No. 6651 was incorporated by reference in the proceedings here under review at the request of Commission counsel (Tr. 8873).

Similarly, Worthington Miner, then Manager of the CBS Television Department, stated that to proceed with the present 525 line television system instead of a system with a greater number of lines would be "inviting disaster" (Tr. 8635).

Moreover, in 1944 CBS took the position that there is a definite relationship between limited resolution and limited picture size:

> "The limiting factor for any larger image is, inexorably, the number of tiny picture elements which it contains—the fewer they are, the more quickly will they 'fly apart' with enlargement." (Docket 6651, Exhibit 272, p. 7)

Regarding this same problem, Mr. McIntosh, testifying for CTI in 1949 regarding the standards then proposed by CBS and now adopted by the Commission, stated:

> ". . . limited resolution, even with the standard television field rates, sets an upper limit to the size of screen which can profitably be used. The CBS proposal involves a further and an inescapable limitation on effective screen size, even apart from the problem of that system's rapidly spinning wheel." (Tr. 4746)

By adopting the CBS system, the Commission now disregards the importance of resolution. The CBS pictures based on the transmission standards fixed by the Commission's order will have only approximately 80,000 picture elements—considerably less than half the picture elements provided by the present black and white television service and the RCA color system (R. 360, 575-76, 584, 795).

3. Picture Size.

The Commission omitted altogether from its criteria any mention of picture size. There is no support in the record, in public preference, or in common sense for this omission.

In 1940 the Commission stressed the importance of developing "a larger picture"*. As a result of continued development work, the size of television pictures has been steadily increased. It was uncontroverted at the hearings that the public is interested in and desires larger and larger pictures.

Contrary to technological development and the public interest, the system proposed by CBS and adopted by the Commission was found by the Commission to be, as a practical matter, limited at the present time to a direct-view receiver picture of a size provided by a 12½ inch picture tube (R. 164, 418).

The seriousness of this limitation is shown by the fact that over 99 per cent of the television receivers in the hands of the public are direct-view receivers, and it is estimated that approximately 90 per cent of all receivers sold today are receivers having picture tubes of 16 inches or larger (R. 602).

The Commission in its Second Report endeavors to minimize the importance of this limitation (R. 418).

Commissioner Sterling strongly dissented from the majority of the Commission in this respect. He stated, and the record will not support a contrary conclusion (R. 429):

> ". . . I do not agree with this belief. I believe that the rapid acceptance by the public of receivers incorporating larger sized black and white tubes as

* FCC, REPORT, Docket No. 5806, p. 9 (May 28, 1940).

they moved from 7″ to 10″ to 12″, then to 16″ and 19″ clearly indicates the preference of the public for large size TV pictures and they will not be satisfied with smaller pictures because they are in color.''

4. Flicker-Brightness.

The Commission's criteria fail to give proper recognition to the importance of the flicker-brightness relationship. This is a fundamental and determinative system characteristic and has been so considered by the Commission in the past. FCC, REPORT, March 18, 1947, 11 F. C. C. 1523, 1531.

As has been pointed out above in the discussion of the Commission's basic findings with respect to the CBS system, there are basic limitations as to the picture brightness without flicker which may be secured with that system. The RCA color television system on the other hand permits nine times the flicker-free brightness of which the CBS system is capable (R. 360-361, 368, 585).

With respect to brightness Mr. Donald Fink had the following recommendation to make in the setting of standards:

> ". . . I feel that the public would like both bright pictures and finely defined pictures . . . and as long as the standards do not prohibit them from getting either, the standards are correctly set.'' (Tr. 7986)

Dr. Engstrom of RCA testified it was his feeling that:

> ". . . I like to see color pictures brighter than the same scene . . . in black and white.'' (Tr. 8155)

The flicker-brightness relationship minimized in the Commission's criteria is a performance characteristic listed by the Condon Committee as one of the factors of fundamental importance in deciding among systems (R. 353).

5. Effectiveness of Channel Utilization.

This all-important characteristic is omitted altogether from the Commission's criteria.

In contrast, the Condon Committee stressed the importance of this characteristic and found that the RCA system is superior to all the other systems with respect to effectiveness of channel utilization. The Condon Committee found that

> "The effectiveness of channel utilization of the RCA color system is the highest of all the systems . . ." (R. 370)

This is of the greatest significance in respect of the basic statutory obligation of the Commission to "encourage the larger and more effective use of radio in the public interest". As stated by this Court in *National Broadcasting Company* v. *United States*, 319 U. S. 190, 216:

> "The facilities of radio are limited and therefore precious; they cannot be left to wasteful use without detriment to the public interest."

The conservation of the radio spectrum and the providing for the most effective use of frequencies is a paramount duty of the Commission.

The more effective channel utilization of the RCA system is an inherent advantage of that system over the CBS system. This is because the RCA system makes use of channel saving techniques which cannot be used by the CBS system (R. 351-52, 362, 368, 372, 586-589). Yet the Commission makes no mention of this advantage.

There is no basis in the record for the Commission to disregard, as it did, the public interest in compatibility, high resolution, unlimited picture size, absence of flicker and effectiveness of channel utilization.

The defects of the CBS system in these five respects—incompatibility—low resolution—small picture size—inferior flicker characteristics—inferior channel utilization—were compelling reasons for the Commission to reject the CBS system. Yet the Commission, by tailoring its criteria, achieved the opposite result.

POINT III.

The Ruling Out of Broadcasting of a Compatible System in Competition With an Incompatible System Is Contrary to Law.

In the preceding points, appellants have taken the position that the adoption by the Commission of an incompatible color television system was contrary to law.

In this case the Commission has departed from the principles of standardization followed for over a decade, including the principle that there shall be a single set of standards for a single service. Having done this, having adopted an incompatible system with all the disrupting effects which the principles of standardization were designed to prevent,* there is no basis in the statute, or in principle or policy, for ruling out the broadcasting of compatible color.

Therefore, this appeal raises the following additional questions:

1. Whether the Commission was authorized to prevent competition in broadcasting where no inter-

* The CBS system uses 405 lines and 48 color fields per second. The RCA system uses 525 lines and 60 fields. The existing television standards have for ten years also used (and will continue to use) 525 lines and 60 fields. Thus we will have, as a result of the order, two "standards"—or "multiple standards"—for television, incompatible with one another.

ference by one broadcaster with the signals of another is involved;* and

2. Whether such action can be sustained where there are no administrative findings to support it.

Both must be answered in the negative.

A. The Limitation on Competition.

The general policy of the Communications Act of 1934, in so far as it relates to broadcasting, is one of competition. The decisions of this Court emphasize the obligation of the Commission to promote competition in broadcasting.

Nevertheless, the action of the Commission rules out the broadcast of compatible color signals—those which can be received in black and white on the nearly 12,000,000 black and white sets now in the hands of the public—and permits only the broadcast of incompatible color signals—those which cannot be received on existing television sets.

The Commission has conceded that the effect of the order is to provide that if a broadcaster chooses to broadcast color television, the signals transmitted "*must con-*

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* The Commission is not justified in saying that, unless standards are first set by the Commission, each broadcaster could transmit whatever type of signal he chose

> "regardless of its interfering effect on other broadcasters . . ." (Motion to Affirm, p. 3).

The fundamental purpose of the Communications Act of 1934 (in so far as it relates to broadcasting) and of its predecessor, the Radio Act of 1927, was to confer upon the Commission authority to prevent just such interference by one broadcaster with the signals of another. The Commission clearly has such authority—before or after the adoption of commercial standards.

This case does not present that problem at all. It presents, in fact, just the converse. It involves for the first time the question whether the Commission has the authority to rule out transmissions which do *not* create any interference with the signals of other broadcasters, which *can* be received on all existing sets, and which do not hurt anyone.

form" to the standards adopted by the Commission (Motion to Affirm, p. 3). These standards have been written for the incompatible CBS system only.

As is thus apparent, the order rules out the broadcasting of television signals in accordance with the RCA compatible system, although the Commission has found that these signals can be received on the 12,000,000 black and white receivers in the hands of the public as black and white pictures, without the owners so much as touching their receivers (R. 149; Motion to Affirm, p. 7).

The Commission has also found that the broadcasting of RCA color would not create electrical interference by one broadcaster with another (R. 145).

The Commission's Reports and order clearly contemplate that television signals transmitted pursuant to the CBS system will be reproduced on some receivers as color pictures and on other receivers as black and white pictures. But the order prohibits the addition of technical characteristics to the existing television signals which would make possible the reproduction of those signals in color as well as in black and white.*

As a result, the present system of black and white must face competition with CBS black and white. But CBS color is immunized from competition with compatible color.

This limitation on competition was imposed in spite of the clear and uncontradicted fact, testified to by the CBS Vice President and Chief Engineer, Dr. Goldmark, that the adoption of compatible color television standards would hurt nobody.

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* This is what the RCA system does. It adds technical characteristics to the existing standard television signal, enabling receivers designed to use those extra characteristics to produce color pictures.

Dr. Goldmark, testifying for CBS, the sole proponent of an incompatible system, stated:

> "There is one non-compatible system. . . . There are two compatible systems . . . I couldn't sit here and tell you not to adopt standards of any of those systems because they don't have that device *because nobody would get hurt by it if you do. They are compatible.*" (Tr. 6546)

B. The Question of the Commission's Authority.

For the first time in the administrative practice of the Commission it has adopted the theory of permitting some competition among transmitting systems within the same broadcast band while suppressing other competition among those systems. No judicial determination by this Court nor any other court supports this assertion of authority by the Commission to limit competition.

The Communications Act gives the Commission no power thus to suppress competition. On the contrary, the policy of that Act, in so far as it relates to broadcasting, is to encourage competition.

This case presents for the first time the question of whether the Commission has the legal power thus to suppress competition.

In fixing television standards the Commission has purported to act in the public interest, convenience and necessity. Its action in fixing such standards in the past has been based upon the position that standards should assure to the public a system of broadcasting

> ". . . which will enable every transmitting station to serve every receiver within its range."*

* FCC, REPORT OF THE COMMISSION IN THE MATTER OF ORDER NO. 65 SETTING TELEVISION RULES AND REGULATIONS FOR FURTHER HEARING, Docket No. 5806, p. 2 (May 28, 1940).

Had the Commission done that here—had it approved a compatible system so that every television transmitting station would serve every receiver within its range—its action would have represented the principle of standardization. And that action would have been consistent with the administrative practice in which the industry, over the years, has acquiesced.

But the Commission did not do that. Its order is the very antithesis of standardization. It adopted a system of color television by which every television transmitting station will *not* serve every receiver within its range.

If this Court should hold that the Commission can lawfully depart from its position requiring a single system of television broadcasting which enables every transmitting station to serve every receiver within its range, and that the Commission can adopt a new concept based on competition rather than standardization, in that case the Court should strike down the order in so far as it rules out competition between compatible color and incompatible color.

All we ask, in that case, is the right for compatible color to compete.

C. The Policy of Competition.

The policy of the Communications Act in respect of competition in the broadcasting field was stated by this Court in *Federal Communications Commission* v. *Sanders Brothers Radio Station*, 309 U. S. 470:

> "... the [Communications] Act recognizes that the field of broadcasting is one of free competition. The sections dealing with broadcasting demonstrate that Congress has not ... abandoned the principle of free competition. ...
>
> • • • • • •

> "Congress intended . . . to permit a [broadcasting] licensee who was not interfering electrically with other broadcasters to survive or succumb according to his ability to make his programs attractive to the public." (pp. 474-75)*

The majority of the District Court did not refer to the action of the Commission in restricting competition. Judge La Buy in dissenting, however, stated that:

> "To prohibit the broadcast of color in completely compatible systems, whether it is RCA or any other fully compatible system, is a bar to competition between compatible and incompatible color and is unreasonable and arbitrary." (R. 881)

As recently as 1950 the Commission cited the *Sanders* case in denying a petition for rehearing which sought to reopen the question of the policy of competition under the Act. In this case the Commission said**

> "The public interest strongly favors competition in the broadcast industry. The whole scheme of regulation embodied in the Communications Act of 1934 is based upon the proposition that the governmental policies appropriate to the areas of free competition rather than those applicable in the public utility and common carrier fields will achieve the most satisfactory utilization of our available broadcast spectrum. This was explicitly recognized by the Court in the *Sanders Bros.* case. . . ."

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* In the *Sanders* case this Court held that the Commission, in granting the application of a new broadcast licensee, need not consider whether the competition resulting from the new broadcaster would be detrimental to the financial operation of an existing broadcaster.

** *In re Application of L. E. Duffey and B. C. Eddins, d/b as The Voice of Cullman*, Docket No. 9325, March 27, 1950; PIKE AND FISCHER, 6 R. R. 164, 169.

D. Absence of Required Findings.

The Commission made no findings on the question of refusing to permit broadcasting of the compatible RCA system in competition with the incompatible CBS system.

On the contrary, the Commission has found that the broadcasting of RCA color would not, in the language of the *Sanders* case,* create electrical interference by one broadcaster with another.**

There is no finding by the Commission, contested or otherwise, that the commercial broadcasting of the RCA compatible television system should not also be authorized together with the incompatible system.

During the hearings there was substantial questioning and testimony with respect to the possibility of permitting the broadcasting of both the CBS and RCA color systems.

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* *Federal Communications Commission* v. *Sanders Brothers Radio Station*, 309 U. S. 470, 475. Appellants are not here contending for the "traffic cop theory" of the Commission's powers, *i. e.*, the theory that the Commission's powers are limited to policing the wavelengths to prevent stations from interfering with each other. *National Broadcasting Company* v. *United States*, 319 U. S. 190, 215. Appellants' position here is rather that the authority which the Commission does have to prevent stations from interfering with one another is no basis for the denial of competition between compatible and incompatible color, since the Commission has found that the broadcasting of compatible color does not create interference between one station and another.

** Except in the particular referred to in the next paragraph, the Commission found that the RCA and CBS systems are alike in having "about the same susceptibility to interference as the present system for both normal operation and offset-carrier operation". (See ¶¶100 and 101 of the First Report, R. 145-46). Stated otherwise, the Commission found that the addition of color to the transmitted television signal does not create interference—either in the CBS or the RCA system.

In the case of the RCA system the Commission said there was an exception as to interference. But the exception to which it referred (¶¶101 and 136 of the First Report and 3(e) of the Second Report; R. 145-46, 161 and 414) was alleged interference *to* RCA color receivers caused by other electronic devices. Whether or not

This would permit the two systems to compete for public approval and acceptance. Brigadier General David Sarnoff, Chairman of the Board of RCA, recommended that if the Commission should adopt standards for an incompatible system, it should permit the broadcasting of compatible systems as well (Tr. 10093-95). He urged that the standards set by the Commission be broad enough to permit any color television systems which met the basic requirements of compatibility, definition equal to the present high-quality television standards, and transmission within a 6-megacycle channel (Tr. 10046-47).

There is no finding by the Commission that the broadcasting of compatible color in competition with incompatible color would not be in the public interest.

So far as appears from the Commission's First and Second Reports, the Commission did not even consider whether there was any middle ground between the exclusive adoption of an incompatible system and the exclusive adoption of a compatible system. The Reports do not show that the Commission considered the possibility or advisability of permitting the broadcasting of compatible color together with the broadcasting of incompatible color.

It is apparent, therefore, that reversal of the District Court's judgment is required by the decision of this Court in *Jacob Siegel Co.* v. *Federal Trade Commission*, 327 U. S. 608. In that case, this Court held that it should not consider whether the complete prohibition there imposed by the Federal Trade Commission was warranted, since the

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this may serve as a basis for action by the Commission to deal with the alleged interference caused by those devices, it does not furnish a basis for the rejection of a system whose broadcast transmissions do not interfere with the transmissions of other broadcasters. In fact, alleged interference *to* television receivers can be and is being eliminated as a matter of receiver design (Tr. 10715-16).

Commission had not considered whether alternatives were possible:

> "But in the present case, we do not reach the question whether the Commission would be warranted in holding that no qualifying language would eliminate the deception which it found lurking in the word Alpacuna. For the Commission seems not to have considered whether in that way the ends of the Act could be satisfied and the trade name at the same time saved. We find no indication that the Commission considered the possibility of such an accommodation. It indicated that prohibition of the use of the name was in the public interest since the cease and desist order prohibited the further use of the name. But we are left in the dark whether some change of name short of excision would in the judgment of the Commission be adequate. . . . Its expert opinion is entitled to great weight in the reviewing courts. But the courts are not ready to pass on the question whether the limits of discretion have been exceeded in the choice of the remedy until the administrative determination is first made." (327 U. S. at pp. 613-14)*

The instant case is *a fortiori* under the *Siegel* case. Whether this Commission has the power to suppress scientific development, such as a compatible color television system, is certainly a grave question. If the Commission does have that power, it is one to be exercised with the greatest restraint and only if no other reasonable alternative is available, since it involves the stultification of the priceless national resource of invention and research.**

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* Cf. *Touhy* v. *Ragen and McSwain*, 19 U. S. L. Week 4151 (U. S. Feb. 26, 1951).

** See Vannevar Bush, *Science—The Endless Frontier*, a Report to the President by the Director of the Office of Scientific Research and Development, 5 (1945).

Here the alternative was to permit compatible color to prove its worth in the arena of public choice—an alternative that is not even discussed in the First and Second Reports.

E. Purported Justification of Limitation on Competition.

As indicated, the Commission made no findings that the broadcasting of the RCA compatible system should not also be authorized in competition with the incompatible system.

In their briefs in the District Court and in their Motion to Affirm in this Court, appellees have attempted to substitute arguments of counsel for this lack of findings. These arguments will now be examined, and contrasted with what the Commission said and did.

In its Second Report the Commission stated that the adoption by it of incompatible color standards would promote competition between color receivers and black and white receivers. It said that:

> ". . . if both types of receivers are offered to the public, *it will be the free forces of competition* which govern whether a customer will buy a color receiver or a black and white receiver." (R. 418)

It is clear from this statement that *what the Commission did in issuing its order was to adopt multiple standards.* For it is obvious that its incompatible color standards are different from the existing black and white standards. Yet both operate *in the same broadcast band.*

This is where the alleged analogy of AM/FM sound broadcasting breaks down. Those services operate in *different* broadcast bands. Black and white and color television operate in the *same* broadcast band—actually in the very channels now used by black and white. They are the same service—the television service.

This is the first time in the administrative practice of the Commission that it has adopted the theory of multiple standards operating in the same broadcast band. The Commission recognized that this was what it was doing and claimed that it had the virtue of establishing competition between incompatible color and black and white.

But the effect is to highlight the competition that the Commission ruled out. No sophistical argumentation about "the particular service involved" can obscure the fundamental fact that the Commission has adopted multiple standards; has provided for some competition; and has suppressed other competition—all within the same broadcast band.

It is in the light of this fact that the Commission's purported justification in argument of the suppression of competition between compatible and incompatible color must be viewed.

1. The Alleged Color Performance of Receivers.

Appellee, in argument purport to justify the Commission's action in limiting competition on the ground that "... for the Commission ... to permit the regular commercial broadcasting of an unsatisfactory system, and thus to encourage the public to purchase RCA color receivers which cannot produce satisfactory color pictures would palpably not be in the public interest" (Motion to Affirm, p. 19). Appellees also stated that "To permit the public to buy new color receivers for a system which does not perform adequately would be an unthinkable violation of public interest".* In the same vein the Commission characterized the RCA system in the District Court as producing "splotches of color in a laboratory". (Tr. of Proc. 240)

* Reply Brief of appellees in District Court, p. 6.

These references by appellees in *argument* to the RCA system as producing "splotches of color in a laboratory" and as having receivers "which cannot produce satisfactory color pictures" are to be compared with what the *record* shows.

One of the Commissioners commented on the record on March 16, 1950 that the RCA system "produced beautiful color" (Tr. 6900).

The Acting Chairman of the Commission stated as to the RCA system on the record on April 11, 1950 that ". . . your picture is greatly improved since your first showing" (Tr. 8516).

Dr. D. B. Judd of the National Bureau of Standards, who was called as an expert witness for CBS during the hearing, testified as to one of the demonstrations of the RCA system: "The show that I saw then . . . was the equal of any of the CBS shows on color fidelity" (Tr. 9314).

Dr. W. R. G. Baker, the head of the Electronics Division of the General Electric Company, testified in respect of the RCA tri-color tube (the heart of the RCA system) that "It is certainly a beautiful development . . ." (Tr. 9711).

Mr. Fink testified, "I would have said on a stack of Bibles that the tri-color tube was impossible" (Tr. 7994).

Even Dr. Goldmark, the chief technical witness for CBS, conceded on cross-examination that the RCA tri-color tube ". . . was an admirable accomplishment . . ." (Tr. 11282).

In the face of these and other statements in the record, there is no basis for the argument of counsel that the RCA color receivers "cannot produce satisfactory color pictures"; and still less for the reckless remark that it produces "splotches of color in a laboratory".

2. The Asserted Authority to Control the Sale of Receiving Sets.

One of the principal reasons asserted by the Commission in argument for denying competition between compatible color and incompatible color is the claim that it should not "permit the public to buy new color receivers for a system which does not perform adequately . . ."* In developing this point the Commission engages in a remarkably subtle assertion of authority to control the sale of receiving sets while purporting to admit it has no such power.

In its brief in the District Court, the Commission stated: "The Commission's jurisdiction is over the standards of broadcast transmissions, *not over the equipment built by receiver manufacturers.*" (p. 45).

In view of the fact, admitted by the Commission itself, that it has no jurisdiction over the sale of television receivers, the Commission has not asserted a lawful reason for denying competition between compatible color and incompatible color systems in saying it would be violating the public interest "To permit the public to buy new color receivers for a system which does not perform adequately . . .".*

The test of whether a receiver performs adequately is not different in law from whether an automobile performs adequately or a refrigerator performs adequately. It is simply the test of whether that receiver, on its performance, can get itself accepted in the competition of the market place.

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* Reply Brief of appellees in the District Court, p. 6.

3. The Argument of Confusion.

Appellees also contend that the Commission's limitation on competition is justified on the ground that multiple standards "would be complex and confusing, and would result in the purchase either of unduly complicated and as yet undeveloped receivers, or of receivers which could receive only some of the color broadcasts and not others." (Motion to Affirm, p. 19).

This argument of "confusion" is the classic one always advanced against competition.

It is to be compared with the statement of the Commission already given, welcoming the idea of competition as between color receivers and black and white receivers:

> "In any event, if both types of receivers are offered to the public, *it will be the free forces of competition which govern whether a customer will buy* a color receiver or a black and white receiver." (R. 418)

This Court cannot be asked to believe that competition between incompatible color and black and white should be encouraged but that the addition of a compatible color system to the range of free public choice would be intolerably confusing.

In fact, the position of the Commission is even more tenuous.

Its Reports contemplate that television signals transmitted by the CBS system would be reproduced on some receivers as color pictures and on other receivers as black and white pictures. But the present system of black and white will continue, and must face competition with CBS black and white. Thus as a result of the order, we would have in television

(1) the standard black and white signals,

(2) CBS black and white signals, and

(3) CBS color signals,

all in competition with one another.

This the Commission calls "the free forces of competition" (R. 418).

But, if we add to the competition

(4) RCA color signals,

the Commission calls that "confusing" (Motion to Affirm, p. 19).

F. Arguments of Counsel Cannot Supply a Lack of Findings.

Even assuming that the *arguments* advanced by counsel for appellees to justify the ruling out of competition between compatible color and incompatible color had any merit, the fact is that the Commission made no *findings* that competition between color systems should not be permitted.*

Arguments of counsel are thus sought to be made a substitute for the lack of findings of an administrative agency. As this Court held in rejecting a similar effort in *Securities and Exchange Commission* v. *Chenery Corp.*, 318 U. S. 80:

> "But the difficulty remains that the considerations urged here in support of the Commission's

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* It seems clear that no such findings could have been made in view of the uncontradicted fact, testified to by the CBS Vice President and Chief Engineer, Dr. Goldmark, that the adoption of compatible color television standards would hurt nobody. Dr. Goldmark, testifying for the appellee-intervener—CBS—stated that:

> "There is one non-compatible system. . . . There are two compatible systems . . . I couldn't sit here and tell you not to adopt standards of any of those systems because they don't have that device *because nobody would get hurt by it if you do. They are compatible*" (Tr. 6546).

order were not those upon which its action was based." (p. 92)

The foregoing rule that administrative action is legally valid only if it is based on *findings* has been consistently applied by this Court. *Jacob Siegel Co.* v. *Federal Trade Commission,* 327 U. S. 608; *Ashbacker Radio Corp.* v. *Federal Communications Commission,* 326 U. S. 327, 333; *Colorado-Wyoming Gas Co.* v. *Federal Power Commission,* 324 U. S. 626, 634; *Eastern-Central Ass'n* v. *United States,* 321 U. S. 194, 208-12; *Securities and Exchange Commission* v. *Chenery Corp.,* 318 U. S. 80, 92-94, 332 U. S. 194, 196-97; *United States* v. *Carolina Freight Carriers Corp.,* 315 U. S. 475, 488-89; *Phelps Dodge Corp.* v. *National Labor Relations Board,* 313 U. S. 177, 196-97; *National Labor Relations Board* v. *Fansteel Corp.,* 306 U. S. 240, 261; *Thomas Paper Stock Co.* v. *Porter,* 328 U. S. 50, 53; *Yonkers* v. *United States,* 320 U. S. 685, 691-92; *United States* v. *Chicago, M., St. P. & P. R.R.,* 294 U. S. 499, 510-11; *United States* v. *Baltimore & Ohio R. R.,* 293 U. S. 454, 463-65, *Panama Refining Co.* v. *Ryan,* 293 U. S. 388, 431-33.

G. Faith in Free Public Choice.

If CBS and the Commission were really confident that the adoption of the CBS system was in fact in the public interest, if they were really confident that in the readily foreseeable future the CBS system would not be outmoded by a compatible system *on the merits,* the protection of the Commission against the competition of the RCA color television system would not be required. (Tr. 10565-66).

RCA, on the other hand, has full confidence in its color system.

RCA and NBC are willing to back this confidence with their reputation for manufacturing high quality television

receivers, and with their reputation for broadcasting high quality television programs. (Tr. 7246-47, 10041, 10052-55, 10563).

The confidence of RCA and NBC in the RCA color system is not based upon laboratory work alone, but upon actual experience.

It is based on months of field testing under conditions which the record shows closely approximate normal commercial broadcasting conditions. (Tr. 6107-09, 7227; Exhibits 303, 311, 312, 314, 368, 369, 427, 429, 430, 441, 444, 449).

It is based upon the improvements which have been made in the RCA color system at which the Commission has refused even to look.

It is based on the conviction that the technical characteristics of the RCA system do not, unlike those of the CBS system, place a low ceiling on ultimate performance.

Unlike CBS, RCA is willing to broadcast its color television system in choice broadcasting time. (Tr. 2980, 2983, 7105-06, 7231) Unlike CBS, RCA has a valuable good will as a television set manufacturer which it would be risking in the sale of color receivers for its color television system (Tr. 2964, 10052-55).

RCA and NBC are confident that if the commercial broadcasting of the RCA color television system is granted to the public, the risking of their good will on the RCA system, both as a manufacturer and as a broadcaster, will not be in vain. (Tr. 10047, 10055)

H. Power of the Court.

Appellants urge that, even if this Court does not hold the order invalid in its entirety, the Court should in any event hold the order invalid in so far as it denies the public the right to receive the RCA color television system as well as the CBS system.

The Court's power to hold the order invalid so far as it denies to such a broadcaster the right to operate commercially in RCA color is clear.

As this Court has noted, a suit such as this, brought under Section 402(a) of the Communications Act, is "a plenary suit in equity". *Columbia Broadcasting System, Inc.* v. *United States*, 316 U. S. 407, 415. As an equity court, this Court possesses broad power to mold its decree so as to effectuate its decision.

A three-judge court, headed by Chief Judge Learned Hand, in *United States* v. *Associated Press*, 52 F. Supp. 362 (S. D. N. Y. 1943), *aff'd*, 326 U. S. 1, was confronted with a similar problem. There the court found that the by-laws of the defendant Associated Press relating to membership contravened the antitrust laws. The court held in part:

> "A judgment may therefore be entered enjoining the defendants from continuing to enforce the by-laws regulating the admission of members in their present form, but leaving it open to them to adopt substitutes . . ." (p. 375)

After holding other aspects of the activities of the defendant to be illegal the court continued:

> "In all other respects the complaint will be dismissed. . . . However, it is appropriate and fair to provide that, if AP sees fit to amend its by-laws, governing the admission of members, it may have leave to apply in this action for supplemental relief upon the new state-of facts. Moreover, in view of the disorganization which meanwhile might take place, . . . we will stay those injunctions for a period of 120 days after the judgment has been entered. That should be time enough for the defendants to decide what changes, if any, they care to make as to admission. . . ." (p. 375)

So in the present case this Court, in accordance with the decision in the *Associated Press* case, can effectuate its decision as to the illegality of that part of the Commission's order which denies compatible color to the public by declaring the entire order illegal but leaving it open to the Commission to remove the illegality by appropriate amendment of its order eliminating the exclusivity now granted the CBS system.*

Thus, there is no basis in law or fact for denying to the public the broadcasting of a compatible system of color television in competition with an incompatible system.

POINT IV.

The Commission Violated its Duty Under the Communications Act and the Administrative Procedure Act to Inform Itself and to take Account of Determinative Facts.

A. Obligation Under the Communications Act.

Under the Communications Act, the Commission is required in a rule-making proceeding to consider all pertinent information available prior to the issuance of rules. This obligation exists so that the Commission will have a sound and informed basis on which to formulate policies in the best interests of the public generally. The Commission failed in this case to discharge that obligation.

The statutory duty of the Commission to inform itself as to the art, the regulation of which is entrusted to it, is

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* See also, *Addison* v. *Holly Hill Fruit Products, Inc.*, 322 U. S. 607, 620-22.

specific and positive. Section 303(g) of the Communications Act provides that the Commission shall:

> "Study new uses for radio, provide for experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest;"

The scope of the duty contained in Section 303(g) was in issue in *National Broadcasting Company* v. *United States*, 319 U. S. 190. There this Court held that the statutory directive in Section 303(g) to encourage the larger and more effective use of radio in the public interest imposed a "comprehensive mandate" upon the Commission (319 U. S. at 219).

The "comprehensive mandate" referred to by this Court obviously includes the duty to consider all available relevant information in carrying out the Commission's obligation to study new uses for radio and generally encourage the larger and more effective use of radio in the public interest.

The administrative practice of the Commission makes it clear that the Commission has up until its decision in this case consistently acted upon the basis that it is under a duty to inform itself in respect of all significant developments in radio research.

In the Commission's Report of May 28, 1940, in which the Commission refused to set commercial standards for television because of the prospect of significant technical advances in the near future, the Commission specifically recognized this obligation in stating that:

> ". . . It would be *a violation of its statutory obligations* for the Commission to disregard *any facts* which might foreclose a proper exercise of its duty to fix transmission standards. . . ." (p. 19)

Nor has the Commission in carrying out its rule-making functions in the establishment of transmission standards in the past deemed that its duty was merely the passive one of considering only such evidence as was adduced by interested parties before the Commission in a formal proceeding.

In the setting of standards for AM and FM sound broadcasting and for television the Commission has heretofore recognized that its mandate to serve the public includes a broad responsibility to consider relevant information from all sources.* For example, the Commission has stated that its FM and black and white television "standards are based upon the *best engineering data available*, including evidence at hearings, conferences with radio engineers and data supplied by manufacturers of radio equipment and by licensees of . . . broadcast stations"**.

The Commission's recognition of its affirmative obligation to search out the facts relevant to proposed rules was evidenced in the early stages of the proceedings which culminated in the order under review. On July 19, 1949 the Commission sent a letter to all experimental television licensees requesting that these licensees send to the Commission all the information which they had with respect to color television. This letter stated that:

> ". . . the Commission wishes to base any decision . . . on the latest and fullest data . . ."

However, the action which the Commission took in this case indicates that it believes its responsibility to the public to base any decision "on the latest and fullest data" ceased when the taking of testimony was completed.

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* As to AM sound broadcasting, see 47 CODE FED. REGS., p. 118 (1949).

** 47 CODE FED. REGS., pp. 205, 245 (1949).

On that theory it refused to consider information of controlling significance concerning scientific developments submitted to it after the testimony was completed on May 26, 1950 but prior to its order of October 10, 1950.

B. Material Disregarded Was of Controlling Significance.

The taking of testimony in the administrative proceedings was completed on May 26, 1950. During that phase of the proceedings, there was testimony by informed witnesses as to what developments were possible with the RCA system.

On July 31, 1950 RCA submitted to the Commission and distributed throughout the industry its Progress Report which stated that certain important developments which had been forecast in the testimony had, since the completion of testimony, actually been accomplished.

On July 10, 1950 the Report of the Condon Committee was released*. In its report the Condon Committee stated its hope that "the report will provide a comprehensive and understandable basis on which the technical factors may be considered in arriving *at a decision*".

After the Commission in its First Report of September 1 disregarded all this information, RCA submitted these two reports as part of its Comments which had been requested by the Commission at the time it issued its First Report.

The materiality of these two Reports in considering whether the Commission was justified in disregarding them lies primarily:

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* The Condon Report was printed as SEN. Doc. No. 197, 81st Cong., 2d Sess. (1950). See R. 330-97.

1. In their authoritativeness and in the conflict between them and the Commission's findings upon which its order is supposedly based; and

2. The reference in those Reports to important facts which had not theretofore been available to the Commission.

The Condon Committee was the most distinguished group of scientists who have ever undertaken to study and report the status of color television. These scientists, in their Report, made findings on highly technical matters involved in a judgment of the relative merits of the respective color systems on the basis of evidence which was broader than that in the Commission's record.

In contrast to the Condon Committee, only two of the seven members of the Commission have even had technical training and one of those two dissented from the adoption of the order. He was formerly Chief Engineer of the Commission. The remaining five are laymen.

With respect to the Condon Report, the majority of the District Court stated:

> "No doubt this report refutes numerous of the findings made by the Commission and gives a far more favorable appraisement of the RCA system than that attributed to it by the Commission." (R. 873).

Similarly, the findings by the Commission with respect to the developments possible with the RCA system were based upon its rejection of testimony which had been confirmed in large part by the accomplishments reported in the RCA Progress Report. There is substantial conflict between the findings of the Commission as to what could not be done with the RCA system and what the Progress Report stated had already been done.

Thus the objectively ascertainable facts stated in the RCA Progress and Condon Reports—facts which were available to the Commission before the issuance of even its First Report and which, as will be shown, were a part of the administrative record before the issuance of its order—conflict in important respects with the fundamental findings upon which the Commission's Reports and order rest.

There is set forth in Appendix B under the headings used by the Commission in its First Report some of the conflicts between the Condon Committee Report and the RCA Progress Report on the one hand, and the Commission's findings on the other. These conflicts were called to the attention of the Commission in the RCA Comments which were submitted prior to the issuance of the Commission's order (R. 316-20).

C. Attempted Justification of Refusal to Consider These Reports.

The appellees, in their Motion to Affirm in this Court and in the court below, have sought to justify the Commission's refusal to consider the RCA Progress Report and the Condon Report on several grounds.

One of these is that the RCA Progress Report and the Condon Reports were not part of the record. This contention will be dealt with in the following sub-section of this brief.

The other grounds upon which appellees seek to justify the Commission's dereliction are that:

> (1) The RCA Progress Report "made no claim of satisfactory and definable development" and no showing of developments which had been carried beyond the stage of "paper presentation" (Commis-

sion's Reply Brief in District Court, p. 3; Motion to Affirm, p. 22).

(2) RCA "never requested that the record be reopened" for the purpose of considering these Reports (Motion to Affirm, p. 21).

(3) The Commission was legally precluded from considering such material (Motion to Affirm, pp. 21, 23).

The first of these contentions, that the RCA Progress Report "made no claim of satisfactory and definable development" (Commission's Reply Brief in District Court, p. 3) and that the RCA Progress Report made no showing of developments which had been carried beyond the stage of "paper presentation" (Motion to Affirm, p. 22) simply does not accord with what was actually stated in the RCA Progress Report.

The RCA Progress Report set forth facts. These were attainments capable of objective ascertainment. For example, it was therein reported that the resolution or picture detail provided by the RCA tri-color tube receivers had been increased because of the increase of the number of phosphor dots on the face of the tubes from 351,000, the figure referred to by the Commission in its First Report, to 600,000. (R. 128, 400)

Whether RCA had succeeded in increasing the number of dots from 351,000 to 600,000 is not a matter upon which reasonable men can differ. Either it had been done or it had not been done. To characterize an unequivocal statement of an accomplished fact such as this as "no claim of satisfactory and definable development" or a development which has not been carried beyond the stage of "paper presentation" is not accurate.

The second argument the appellees have resorted to in their effort to justify the Commission's disregard of the RCA Progress and Condon Reports is that "RCA never requested that the record be reopened" for the purpose of considering these reports.

In the first place, the Commission has an affirmative duty and a responsibility of its own to the public to keep itself informed and to avoid issuing rules designed to operate for the indefinite future on the basis of false assumptions of fact. The Commission's duty in rule-making proceedings is to reach the right result regardless of what any party appearing before it does or does not do.

In the second place, prior to the issuance of the order, RCA specifically invited the attention of the Commission to its duty to consider the facts stated in the RCA Progress Report and in the Condon Report. In the RCA Comments which were submitted to the Commission on September 28, 1950 in response to the Commission's request, RCA pointed out that the statements set forth in the RCA Progress Report confirmed the testimony during the hearing of industry experts and the statements in the Condon Report as to the merits and potentialities of the RCA system. The RCA Comments also stated:

> "We believe that in a rule-making proceeding of the importance of this one, it is the duty of the Commission, before making findings at odds with those of a group of scientists of the stature of the Condon Committee, to keep the record open and to inform itself as to the basis for the findings of that Committee.
>
> "We believe that, in the circumstances, the Commission had the same obligation with respect to the RCA Progress Report. That report was given to the Commission a month before its decision. If the testi-

> mony of the electronics experts to whom we have referred had been accepted, there would of course have been no need to consider a report which said that improvements which had been promised during the hearing had actually been accomplished. But a decision was drafted which rejected that testimony and outlawed a system on the basis of alleged defects which the Progress Report said had already been eliminated. This, we submit, was to turn its back on evidence when the Commission had an obligation to look." (R. 300-01)

In the third place, the argument that RCA did not ask that the record be reopened is wholly disingenuous. In the District Court the appellees expressly stated of the RCA Petition of October 4 (prior to the adoption of the order), which was denied by the Commission:

> "Although not so entitled, this petition for a delay was essentially one to reopen the record." (Appellees' Brief in the District Court, p. 49)

In their next argument, the appellees have gone beyond the contention that an agency which is under a duty to promote the public interest and which is engaged in a rule-making proceeding involving the evaluation of a dynamic science can lawfully refuse to inform itself of pertinent and determinative data fully available to it.

Appellees even contend that the Commission was legally precluded from considering such material. Thus, the Motion to Affirm repeats the position taken by the Commission before the District Court to the effect that consideration by the Commission of either the Condon Report or the RCA Progress Report would have been legally improper (Motion to Affirm, pp. 21, 23).

If administrative agencies are to take the position that they are legally precluded from considering pertinent facts in a rule-making proceeding, the administrative process is certain to stultify itself.

One of the chief purposes underlying the creation of the administrative process was the need for a flexible governmental body—a body possessed of the procedural latitude necessary to gather and to consider all relevant information when it was engaged in the promulgation of rules affecting the public interest. It was recognized that the judicial process, circumscribed as it is by various formalities, including a formal record, was less adapted to cope with many of the complexities of modern civilization.

As stated by James M. Landis in *The Administrative Process* (1938):

> "One other significant distinction between the administrative and the judicial processes is the power of 'independent' investigation possessed by the former. The test of the judicial process, traditionally, is not the fair disposition of the controversy; it is the fair disposition of the controversy *upon the record as made by the parties**. . . . the judge must not know of the events of the controversy except as these may have been presented to him, in due form, by the parties." (pp. 37-38)

In contrast,

> "For that [administrative] process to be successful in a particular field, *it is imperative that controversies be decided as 'rightly' as possible, independently of the formal record the parties themselves produce.* The ultimate test of the administrative is the policy that it formulates; not the fairness as between the

* Italics in original.

> parties of the disposition of a controversy on a record of their own making." (p. 39)

Similarly, Kenneth Culp Davis, Professor of Law at The University of Texas, has stated:

> "Congress has assigned to each regulatory agency the affirmative duty of securing all relevant information, whether produced by the parties or not."*

The Commission's position now that it was legally precluded from considering this pertinent and controlling data is in contrast to the position taken by it before this Court in *National Broadcasting Company* v. *United States*, 319 U. S. 190. In the present case the Commission has attempted to rationalize its disregard of the Condon Report in part on the basis that it was "off the record", and in part because it was made to the Senate Interstate and Foreign Commerce Committee (Appellee's Brief in District Court, p. 28). In the *National Broadcasting* case, on the other hand, the Commission, in a rule-making proceeding, had used data which were not introduced in evidence at the hearings and part of which was not a matter of public record or even of common knowledge. This data included "testimony presented before the Senate Committee on Interstate Commerce" (Government Brief in that case, p. 130).

In the 1943 brief, the Commission, speaking of the rule-making proceeding held in the *National Broadcasting* case, pointed out that

> ". . . the commission was not here conducting a negligence case. . . . this Court, as well as administrative law commentators, have recognized . . . that the requisites of a hearing preceding administrative

* *Official Notice*, 62 HARV. L. REV. 537, 542 (1949).

rule-making may differ from those preceding an adjudication.

* * * * * *

"The touchstone, then, [in rule-making] is not perfect conformity to the procedure of judicial hearings, but, broadly, its fairness as affording full opportunity to present relevant facts and arguments." (Government Brief in *National Broadcasting* case, pp. 131-33)

Thus, the Commission in 1943 advocated principles which go beyond those for which appellants now contend, for, as will be shown in the following section, the data disregarded by the Commission in its color decision were part of the record.

D. Violation of Administrative Procedure Act.

Not only did the Commission violate its obligations under the Communications Act; the Commission's refusal to consider relevant matter presented violated the Administrative Procedure Act as well.

Section 4(b) of the Administrative Procedure Act, dealing with rule-making proceedings, provides in part:

"After notice required by this section, the agency shall afford interested persons an opportunity to participate in the rule making through submission of written data, views, or arguments with or without opportunity to present the same orally in any manner; and, *after consideration of all relevant matter presented*, the agency shall incorporate in any rules adopted a concise general statement of their basis and purpose."

Appellants believe that this requirement that the administrative agency shall consider

"... *all* relevant matter presented ..."

means just what it says.

After the Commission in its First Report refused to consider the Condon Report and the RCA Progress Report, RCA submitted these Reports as part of its Comments, which had been requested by the Commission. The Reports thus became a part of the administrative record.

But the Commission has admitted that in issuing its order it did not consider the Report of the Condon Committee nor the RCA Progress Report. In respect of the former, for example, it said in its brief in the District Court:

> "This Report was not part of the record before the Commission. ... It is obviously improper to consider such a report ..." (p. 28)

Although the proceedings before the Commission were clearly rule-making proceedings, the appellees now attempt to justify the Commission's refusal to consider "relevant matter presented" on the ground that somehow this rule-making proceeding was different from other rule-making proceedings. They endeavor to differentiate on the ground that in this proceeding there was a "testimonial hearing" (Motion to Affirm, p. 23).

This differentiation, it is submitted, is not in accord with the statute. Nor is it in accord with the Commission's express statement that in establishing "rules and regulations, *and engineering standards*, ... it *must conform to the Administrative Procedure Act* which prescribes uniform rule-making practices for Federal agencies to follow" (16 FCC ANN. REP. 13-14, (1950)).

The statute provides that interested persons shall be given an opportunity to "participate in the rule making through submission of written data, views, or arguments *with or without* opportunity to present the same orally in any manner. . . ." The statute does not set up two alternative procedures—one covering written data and the other an oral presentation. It shows on its face that the oral presentation is *in addition* to the "written data, views, or arguments". The statute directs that the agency shall consider "*all* relevant matter presented". The word "*all*" covers both the written and the oral presentations.

It is submitted that Section 4(b) of the Administrative Procedure Act does not permit an agency to refuse to consider written data submitted in those cases in which opportunity for oral presentation is afforded nor to pick and choose what relevant matter it will consider.

The Government's attempt to confine the application of Section 4(b) to rule-making proceedings in which no testimonial hearings are held has no support in the statute.* The Condon and RCA Progress Reports were part of the administrative record.

E. Illegal and Impossible Conditions Imposed by Commission on Considering Additional Data.

The Commission in its First Report recognized its need for further information with respect to the CBS system before the ultimate conclusion could be reached that adoption of that system was in the public interest. The Com-

* If considerations of fairness required, as appellees have stated, "that the record be reopened for the introduction of these reports as evidence subject to cross-examination by the other parties", that is precisely what the Commission should have done (Motion to Affirm, p. 21).

mission stated that the adoption of the CBS system without more information would mean that the Commission was

> "compelled to speculate as to an important basis for its decision . . ."

and that

> "the Commission's determination on an important part of its decision would be based on speculation and hope . . ." (R. 165)

The Commission also specifically noted in its First Report the desirability of obtaining further information as to improvements in existing compatible systems and new compatible systems before reaching a final decision (R. 165-66).

Nevertheless, the Commission a little over a month later disregarded the further information which it had received regarding the RCA system, rejected a proposal whereby it could have confirmed for itself the facts reported, swallowed its own expressed "speculation and hope" about the CBS system, and adopted that system finally without going into the matters with respect to which it said it should have further information.

This was done in spite of the recognition by the Commission in its First Report that:

> "the institution of these proceedings stimulated great activity in the color field and that since fundamental research cannot be performed on schedule, it is possible that much of the fruit of this research is only now beginning to emerge." (R. 166)

The immediate reaction is why did the Commission adopt its order without obtaining the evidence with respect to the CBS system which the Commission itself had recog-

nized was needed and without even considering the improvements in the RCA system?

The Commission seemed to have set itself a straightforward job to do. That was to get the proof which its First Report had indicated the Commission ought to have on the deficiencies of CBS in respect of direct-view picture size, and picture detail, and on improvements in the RCA and other compatible systems.

But the Commission referred to what it called "the aggravation of the compatibility [*sic*] situation" (R. 166). This was the Commission's way of saying that, as the number of black and white sets in the hands of the public was increasing rapidly, the capriciousness of adopting a color system that would give no picture at all on those sets would become more and more evident.

The Commission said it would take the additional proof it needed only if the television manufacturing industry—*over which the Commission has no jurisdiction whatsoever**—would comply with two conditions.

Those conditions were (R. 166-68):

> (a) That manufacturers of television receivers agree to change their entire production of black and white television receivers, from and after early November 1950, to a wholly new and basically different design which would operate on a continuously variable or "bracket" set of black and white standards (including the number of lines and fields called for by the CBS standards); and

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* This has been conceded by the Commission. As was stated by the Commission to the District Court:

> "The Commission's jurisdiction is over the standards of broadcast transmissions, not over the equipment built by receiver manufacturers." (Appellees' Brief, District Court, p. 45.)

(b) That no one contest this immediate and major change by the Commission, *without a hearing*, in the standards for black and white television which had been put in effect in 1941 after extensive hearings.

The Commission said that if these conditions were not met it would adopt forthwith the CBS color system.

The Commission attempted in the court below to deny that the foregoing were "conditions" (Appellees' Brief, pp. 44, 46). This effort by the Commission overlooks its own statement in the 16th Annual Report of the Commission for the fiscal year ending June 30, 1950 which was submitted to Congress pursuant to the provisions of the Communications Act. In that Report the Commission stated:

> "However, in view of the compatibility [*sic*] problem and the possibility of improvements in TV color systems generally, the Commission proposed postponing a color decision and adopting monochrome 'bracket standards' which would enable black-and-white TV sets incorporating those standards to receive CBS color transmissions *in monochrome*. This proposal was *conditioned* to receiver manufacturers agreeing to equip future TV sets with a manual or automatic switch for that purpose." (p. 10)

Bracket standards were the heart of the Commission's conditions for considering further information with respect to color television. But the Commission's Notice of Further Proposed Rule Making which instituted the color hearings had made no mention of bracket standards. Nor was there a scintilla of evidence with respect to them during the hearings.

As one Commissioner, the former Chief Engineer, stated in his dissent (R. 421):

> "The subject of bracket standards was not at issue in the hearing nor was the subject even ad-

> vanced during the hearing. . . . the subject of bracket standards was a new concept in field and line scanning proposed after the hearing record closed. It came as a surprise to industry and was not based upon information appearing in the record of this proceeding."

The Commission requested that the television manufacturers "submit comments" (R. 167). Manufacturers representing most of the industry production responded. Almost without dissent they pointed out to the Commission that it would be impossible to get into commercial production of the basically different "bracket standard" receivers within the time required by the Commission, or any approximation of that time. (See dissenting opinion of Commissioner Sterling (R. 421-29)).

It was also pointed out that the present black and white standards should not be abolished, *without a hearing*, in favor of the major change in those standards proposed by the Commission (R. 307-09).

The Commission's bracket standards proposal, if accepted, would have made it impossible for the public to buy present models of receivers. Thus the Commission proposed to force the public to pay the added cost of black and white receivers capable of operating (although with an admittedly degraded picture) in black and white on the CBS color system as well as on present standards. Accordingly, the first part of the RCA Comments was directed to this purely color reason for the proposed change in the black and white television standards.

RCA also pointed out in its Comments, that, if the television manufacturers had to modify their receiver production to meet the two conditions laid down by the Commission, the result would be not only to raise the cost to the consumer of television receivers but as well to lower the

already critically short supply of television receiver components (R. 315-16).

RCA pointed out that since the start of the Korean conflict, industrial activity has increased substantially, resulting in increasing shortages of certain materials and making the procurement of certain television components much more difficult. The additional components which would be needed for bracket standard receivers use iron, steel, copper, nickel, tin and tungsten, all of which have been found by the National Production Authority in its first regulation* issued on September 18, 1950 to be in critically short supply (R. 315).

RCA also pointed out to the Commission that never before had an administrative body of the United States undertaken to coerce the freedom of choice of American manufacturers in what they may build and sell under threat that if they do not obey, drastic consequences to the public would follow (R. 316).

The Commission was urged to withdraw from its position.

After it became apparent from the comments of the industry that the Commission's "bracket standards" conditions were impossible to comply with, RCA, by its Petition of October 4, 1950, formally asked the Commission to take the evidence it had said it needed, without insisting on the impossible conditions (R. 408-09).

This the Commission refused to do. It denied the RCA Petition and, on October 10, adopted the CBS system without taking any additional evidence.

The Commission had committed itself that unless the industry accepted impossible conditions the CBS system would be adopted at once. It had threatened the industry

* 15 FED. REG. 6253 (September 19, 1950).

that unless these impossible conditions were accepted it would not consider reopening the hearings.

And as the conditions could not be met the hearings were not reopened. The Commission's threat was carried out.

It was carried out even though the Commission had expressly asked for comments of the industry on its proposed action. Presumably the Commission believed that it was possible to meet its condition with respect to the manufacture of bracket standard receivers. Otherwise this condition was not imposed by the Commission in good faith.

Two Commissioners dissented from the adoption of the order (R. 421-29, 429-31). They realized that the fiasco of "bracket standards" called for reconsideration. They knew that its willingness to consider improvements *only on impossible and illegal conditions* could not be defended.

But the Commission—or a majority of the Commission—was unwilling to admit such a blunder. They preferred to take their chances on *"speculation and hope"*.

POINT V.

The Court Below Did Not Afford Appellants Proper Judicial Review.

A. The Standard Of Judicial Review Applied By The Court Below Was Incorrect.

The court below proceeded on the basis of a misconception as to the standard of judicial review which it is required to follow. In its opinion, the court below stated ". . . we must give recognition to our limited scope in reviewing an order of an administrative agency." (R. 866)

It cited cases which it stated "so firmly delineated" the "scope of review" which it applied (R. 867).* These cases were all decided prior to the passage of the Administrative Procedure Act. But since this case was decided in the three-judge District Court, this Court has held that under that Act

> "courts must now assume more responsibility for the reasonableness and fairness of . . . [administrative] decisions than some courts have shown in the past."

Universal Camera Corp. v. *National Labor Relations Board*, 19 U. S. L. Week 4160 (U. S. Feb. 26, 1951).**

Not only is it apparent on the face of the opinion of the court below that it too drastically restricted itself in its judicial function, but in the *Universal Camera Corporation* case this Court specifically noted that the Seventh Circuit had followed a standard of judicial review contrary to that which this Court has now held to be proper.

Under the holding of this Court in the *Universal Camera Corporation* case, the court below had the duty with respect

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* The cases were *American Telephone & Telegraph Co.* v. *United States*, 299 U. S. 232; *Federal Security Administrator* v. *Quaker Oats Co.*, 318 U. S. 218; and *National Broadcasting Company* v. *United States*, 319 U. S. 190.

** Appellees cited the same three cases in their Motion to Affirm (p. 13), as did the District Court, plus two additional cases (p. 15). The two additional cases were *National Labor Relations Board* v. *The Pittsburgh Steamship Co.*, 337 U. S. 656, and *United States* v. *Yellow Cab Co.*, 338 U. S. 338, at page 341 where the *Pittsburgh Steamship Company* case is cited. Since the appellees filed their Motion to Affirm, this Court has again ruled in the *Pittsburgh Steamship Company* case. In giving the opinion of a unanimous Court on February 26, 1951, holding that the scope of judicial review of action by administrative agencies had been extended by

to the decision of the Commission to determine whether "the evidence supporting that decision is substantial, *when viewed in the light that the record in its entirety furnishes.*" This it did not do. Indeed, the court side-stepped this question by stating (R. 871):

> "While the findings of the Commission are severely criticized, it is not contended in the main that they are not supported by substantial evidence."

Contrary to the view of the District Court, appellants contend and have contended throughout this case that there is no substantial support for the findings and order of the Commission.

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the Administrative Procedure Act and the Taft-Hartley Act, Mr. Justice Frankfurter stated:

> "The case is before us for the second time. It arises from the petition of the Pittsburgh Steamship Company to review an order of the Board, entered August 13, 1946, directing it to reinstate a dismissed employee and to terminate what were found to be coercive and discriminatory labor practices. 69 N. L. R. B. 1395. The Court of Appeals originally denied enforcement on its finding that the order was vitiated by an underlying bias on the part of the trial examiner. 167 F. 2d 126. On certiorari, we rejected the Court of Appeals' conclusion that resolution of every controverted fact in favor of the Board established invalidating bias on the examiner's part. We also found that the record disclosed 'evidence substantial enough under the Wagner Act.' 337 U. S. 656, 661. That conclusion, it is proper to say, was reached on the assumption that under the Wagner Act substantiality was satisfied if there was evidence in the record in support of the Board's conclusions. But we remanded the case to the Court of Appeals to consider the effect on its reviewing duty of the Administrative Procedure and the Taft-Hartley Acts, both having come into force between the Board's order and the Court of Appeals decision. The Court of Appeals has now held in accordance with our own view, that the scope of review had been extended 'beyond the requirements of the Wagner Act,' 180 F. 2d 731, 736, and that in the light of the new requirements the record considered as a whole disentitled enforcement of the order."

In appellants' complaint, filed in the court below, it is stated (R. 13):

> "The Commission's Order is illegal, void and beyond the power, authority and jurisdiction of the Commission for the following reasons:
>
> • • • • • •
>
> "(c) The Order is unsupported by substantial evidence . . ."

In appellants' brief filed November 13, 1950 in the court below, Point III thereof was entitled "The Order of the Commission is Arbitrary and Capricious and is Not Supported by Substantial Evidence." This point consisted of 27 pages.

In appellants' reply brief in the court below, filed November 28, 1950, Point II thereof was entitled "Reply to Alleged 'Basic Findings'—They Are Not Supported by Substantial Evidence and They Do Not Support the Order." This Point covered 21 pages of the reply brief. Supplementing this Point were two annexes to the brief consisting of an additional 21 pages.

That the appellants did contend in the court below that the order is not supported by substantial evidence has been recognized by the appellees. In the Motion to Affirm filed in this Court on behalf of the Commission and CBS, it is stated (p. 14):

> ". . . appellants urged in the Court below, and urge here, that there was no substantial supporting evidence . . ."

In these circumstances, it is submitted that the court below could not properly avoid, as it did, the duty of reviewing "the record as a whole" to see whether the order and findings of the Commission were supported by substan-

tial evidence. The result is that appellants have been deprived of the judicial review to which, on the basis of this Court's decisions, they are entitled. *Universal Camera Corp.* v. *National Labor Relations Board,* 19 U. S. L. Week 4160 (U. S. Feb. 26, 1951); *National Labor Relations Board* v. *The Pittsburgh Steamship Co.,* 19 U. S. L. Week 4136 (U. S. Feb. 26, 1951).

B. District Court's Failure To Give Proper Judicial Review In Other Important Respects.

In the instant case, it is submitted, appellants were not afforded by the court below the judicial review to which they are entitled with respect to other important issues in this case. Many of the important questions involved in this case were left unresolved by the District Court.

Thus, the District Court's opinion did not mention the contentions that:

1. The adoption of incompatible color television standards was contrary to the statutory standard of public interest which governs Commission action.

2. The refusal to adopt compatible color television standards was arbitrary and contrary to the statutory standard of public interest.

3. The ruling out of the broadcasting of a compatible system in competition with an incompatible system was contrary to law.

4. The Commission's action in this respect is not supported by the Commission's findings.

5. The Commission, by refusing to consider relevant matter presented, violated the Administrative Procedure Act.

6. The order of the Commission is unlawful in that it was based upon the non-compliance of television manufacturers with conditions which the Commission had no authority to impose and with which compliance was impossible.

The District Court mentioned but did not resolve the contentions that:

1. The evidence alleged to support the order was evidence taken early in the hearings which had been superseded and rendered obsolete by evidence of later technical developments achieved during the course of the hearings.

2. The Commission had abused its discretion and violated statutory command in refusing to consider relevant matter submitted, at the Commission's request, after the close of the testimony but before the close of the administrative record.

The reason for this failure to make any decision on so many contested and decisive points is apparent on the face of the District Court's opinion. The District Court, it appears, intended to leave the decision of the case to this Court.

Thus, the majority of the District Court stated (R. 866):

> "... we have been unable to free our minds of the question as to why we should devote the time and energy which the importance of the case merits, realizing as we must that the controversy can only be

> finally terminated by a decision of the Supreme Court. This is so because any decision we make is appealable to that court as a matter of right and we were informed during oral argument, in no uncertain terms, that which otherwise might be expected, that is, that the aggrieved party or parties will immediately appeal. In other words, this is little more than a practice session where the parties prepare and test their ammunition for the big battle ahead."

In addition, in giving the basis for its order dismissing the complaint and allowing defendants' motion for summary judgment, the majority of the District Court said (R. 875):

> "Thus, as we evaluate the situation, there are *two* courses open, (1) to allow defendants' motion for a summary judgment, and (2) to vacate the order and send the proceeding back to the Commission for further consideration in view of recent developments in the color television field as well as the rapidly changing economic situation. A pursuance of the latter course, assuming we have such authority, of which there may be doubt, would inevitably result in the prolongation of the controversy which badly needs the finality of decision which can be made only by the Supreme Court. In other words, the interests of all, so we think, will be better served with this controversy on its way up rather than back from whence it comes."

For all practical purposes, therefore, appellants have not been given their day in court. Under established law, in these circumstances the judgment of the court below should be reversed. *Lutcher & Moore Lumber Co.* v. *Knight*, 217 U. S. 257; *Ex parte Harley-Davidson Motor Co.*, 259 U. S. 414; *Oklahoma Natural Gas Co.* v. *Russell*, 261 U. S. 290; *Federal Communications Commission* v. *WJR, The Goodwill Station, Inc.*, 337 U. S. 265.

C. Relevant Matter Presented To The Commission Not Properly Considered By Court Below.

It has been pointed out above that two relevant and significant reports, namely, the report of the Condon Committee and the RCA Progress Report, were presented to the Commission and that the Commission refused to consider them. In the court below, appellants contended that this refusal of the Commission was improper and unlawful.

In endeavoring to dispose of this contention, the court below stated that such matters were "not properly before the court" and that: "A consideration of such matters would in effect amount to a trial *de novo*, which we are without power to grant" (R. 872).

Such a consideration by the court below, appellants submit, would be in no sense a trial *de novo*. On the contrary it is merely the normal function which any reviewing court must perform in order to determine whether evidence was impfoperly excluded.

In many cases, of course, only an offer of proof is available for consideration by the reviewing court. In the instant case, however, instead of being the subject of an offer of proof, the documents were actually a part of the administrative record. Indisputably they were physically in the record before the court below.

Only by looking at the documents themselves could the District Court determine whether the Commission had acted lawfully in refusing to consider them.

If the view of the court below in this respect were to prevail, it would mean that there would be no way whereby an aggrieved party could secure judicial review of the action of an administrative agency in excluding or refusing to consider evidence which the aggrieved party contends is of controlling importance.

POINT VI.

The Commission's Reliance Upon a Member of Its Engineering Staff Who Had an Interest in the Outcome Was Improper.

A decision with respect to the relative merits of television systems on technical grounds requires a high degree of technical competence. Of the seven Commissioners, however, five are laymen and only two have had technical training.* On this state of facts it was essential that the Commission obtain from its engineering staff the most competent and the most disinterested technical advice possible.

Instead, the Commission relied for technical assistance upon a staff engineer who had an interest in the adoption of the incompatible CBS system. Chapin had invented a device usable with the incompatible CBS system but not with a compatible color system. He had assigned this invention to the government.

The salient facts with respect to this staff engineer, as set forth in appellants' complaint and affidavits and not denied in any of the appellees' affidavits, motions or briefs are as follows:

1. The Commission staff engineer, Chapin, took a most active role throughout the hearings and was in charge of the Commission's laboratory which tested the color systems. He had an interest of professional prestige and reputation in the adoption of the CBS system although no financial interest, and supported the CBS system throughout the hearings. He was the only witness other than CBS witnesses who supported an incompatible system (R. 581-82).

* One of these two, who was formerly Chief Engineer of the Commission, dissented from the adoption of the order.

2. In weighing the highly technical issues before it, the Commission relied upon this engineer's advice (R. 12-13, 558, 581).

3. This engineer advised the Commission in the absence of the proponents of color systems and participated in the formulation and preparation of the order and Reports of the Commission which are under review (R. 13, 558, 581).

Chapin's predisposition in favor of the CBS system is apparent from the administrative record. To illustrate, part of the testimony which he gave during the hearing consisted of an alleged comparison of the RCA color receivers with CBS color receivers. Chapin claimed that CBS receivers were superior to the RCA receivers because the latter were too big and complex. Actually Chapin's testimony related to certain receivers having over 100 tubes, which were used by RCA in the early part of the color hearing (Tr. 10627).

Chapin made no reference to the RCA tri-color tube receivers demonstrated by RCA. These receivers were substantially of the same size as present commercial model black and white receivers. One type of RCA tri-color tube receiver used only 46 radio tubes; another used only 37 tubes—just 10 more than the commercial model black and white receivers of comparable type (Tr. 8131, 10630).

These receivers were demonstrated informally to members of the Commission's staff, including Chapin, on March 23, 1950. On the very day Chapin saw this demonstration he prepared the exhibit on which he based his testimony comparing the CBS color receivers with the RCA color receivers. His testimony was given on April 11—nineteen days after he had seen a demonstration of the simplified and compact RCA receivers. But Chapin took no account in his own presentation to the Commission of these simplified RCA receivers (Tr. 10627-32).

On cross-examination by RCA counsel, Chapin admitted that the very latest disc receiver demonstrated by CBS was *larger* than the receivers shown by RCA on March 23 (Tr. 10631-32). And on the point of complexity, Chapin had to concede that the issue is now at least a stand-off as between RCA and CBS (Tr. 10632).

But the Commission's findings read as if Chapin's cross-examination had never occurred (R. 153, 160, 414).

In their Motion to Affirm in this Court, the appellees have argued that no error resulted from the Commission's reliance upon Chapin; first, because the objection by RCA when Chapin's interest became known was not properly phrased, and second, because it is not shown that the Commissioners were themselves biased (Motion to Affirm, p. 26).

Appellants submit that the objection made by RCA did raise for the Commission's consideration the question whether Chapin should be allowed to continue in the proceedings. The Commission's obligation to the public to avoid bias on the part of its staff is not a contingent one which becomes fixed only if certain magic words are spoken. The Commission's attention was directed to the point (Tr. 5980-82). This was enough.

So also with the argument that appellants have not shown that the Commissioners were themselves biased. As is true of many agencies dealing with complex scientific and technical problems, this is essentially a lay Commission. When passing on such problems, the technical findings which such an agency makes necessarily depend on the technical advice which it gets. The public has a right to expect that those members of its staff who are permitted to participate in the decision-making process will be free from personal interest in the Commission's decision.

As a result of the participation of Chapin, the public was deprived of what it had a right to expect—an impartial

analysis by the Commission of all the facts relating to the public interest.

Chapin participated in the decision-making process. His testimony and that of CBS was accepted and acted on by the Commission. The testimony of completely impartial scientists and of industry experts was tossed aside, and a system was adopted against the advice of substantially all the outstanding electronic organizations in the United States that the CBS system is neither the best available nor the system to provide a sound color service on a national basis.

Conclusion.

For these reasons it is submitted that the decision of the District Court dismissing appellants' complaint should be reversed and the cause remanded to that court for the issuance of a permanent injunction against the order.

Respectfully submitted,

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March 19, 1951

Appendix A.

Text of Statutes Involved

A. Communications Act of 1934, as amended (47 U. S. C. §151 *et seq.*)

§303. Except as otherwise provided in this chapter, the Commission from time to time, as public convenience, interest, or necessity requires, shall—

* * * * * *

(c) Assign bands of frequencies to the various classes of stations, and assign frequencies for each individual station and determine the power which each station shall use and the time during which it may operate;

* * * * * *

(e) Regulate the kind of apparatus to be used with respect to its external effects and the purity and sharpness of the emissions from each station and from the apparatus therein;

(f) Make such regulations not inconsistent with law as it may deem necessary to prevent interference between stations and to carry out the provisions of this chapter: *Provided, however,* That changes in the frequencies, authorized power, or in the times of operation of any station, shall not be made without the consent of the station licensee unless, after a public hearing, the Commission shall determine that such changes will promote public convenience or interest or will serve public necessity, or the provisions of this chapter will be more fully complied with;

(g) Study new uses for radio, provide for experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest. (48 Stat. 1082).

* * * * * *

§402. (a) The provisions of Title 28, relating to the enforcing or setting aside of the orders of the Interstate Commerce Commission, are made applicable to suits to enforce, enjoin, set aside, annul, or suspend any order of the Commission under this chapter (except any order of the Commission granting or refusing an application for a construction permit for a radio station, or for a radio station license, or for renewal of an existing radio station license, or for modification of an existing radio station license, or suspending a radio operator's license), and such suits are authorized to be brought as provided in such Title 28. (48 Stat. 1093, as amended, 50 Stat. 197, 63 Stat. 108).

B. Judicial Code (28 U. S. C.)

§1253. Direct appeals from decisions of three-judge courts.

Except as otherwise provided by law, any party may appeal to the Supreme Court from an order granting or denying, after notice and hearing, an interlocutory or permanent injunction in any civil action, suit or proceeding required by any Act of Congress to be heard and determined by a district court of three judges. (62 Stat. 928)

• • •

§1336. Interstate Commerce Commission's orders.

Except as otherwise provided by Act of Congress, the district courts shall have jurisdiction of any civil action to enforce, enjoin, set aside, annul or suspend, in whole or in part, any order of the Interstate Commerce Commission. (62 Stat. 931)

• • •

§2323. Duties of Attorney General; intervenors.

The Attorney General shall represent the Government in the actions specified in section 2321 of this title and in actions under sections 20, 23, and 43 of

Title 49, in the district courts, and in the Supreme Court of the United States upon appeal from the district courts.

The Interstate Commerce Commission and any party or parties in interest to the proceeding before the Commission, in which an order or requirement is made, may appear as parties of their own motion and as of right, and be represented by their counsel, in any action involving the validity of such order or requirement or any part thereof and the interest of such party.

Communities, associations, corporations, firms, and individuals interested in the controversy or question before the Commission, or in any action commenced under the aforesaid sections may intervene in said action at any time after commencement thereof.

The Attorney General shall not dispose of or discontinue said action or proceeding over the objection of such party or intervenor, who may prosecute, defend, or continue said action or proceeding unaffected by the action or nonaction of the Attorney General therein. (62 Stat. 970, as amended 63 Stat. 105.)

C. Administrative Procedure Act (5 U. S. C. § 1001 *et seq.*)

§4. Except to the extent that there is involved (1) any military, naval, or foreign affairs function of the United States or (2) any matter relating to agency management or personnel or to public property, loans, grants, benefits, or contracts. . . .

(a) *Notice.*—General notice of proposed rule making shall be published in the Federal Register (unless all persons subject thereto are named and either personally served or otherwise have actual notice thereof in accordance with law) and shall include (1) a statement of the time, place, and nature of public rule making proceedings; (2) reference to

the authority under which the rule is proposed; and (3) either the terms or substance of the proposed rule or a description of the subjects and issues involved. Except where notice or hearing is required by statute, this subsection shall not apply to interpretative rules, general statements of policy, rules of agency organization, procedure, or practice, or in any situation in which the agency for good cause finds (and incorporates the finding and a brief statement of the reasons therefor in the rules issued) that notice and public procedure thereon are impracticable, unnecessary, or contrary to the public interest.

(b) *Procedures.*—After notice required by this section, the agency shall afford interested persons an opportunity to participate in the rule making through submission of written data, views, or arguments with or without opportunity to present the same orally in any manner; and, after consideration of all relevant matter presented, the agency shall incorporate in any rules adopted a concise general statement of their basis and purpose. Where rules are required by statute to be made on the record after opportunity for an agency hearing, the requirements of sections 1006 and 1007 of this title shall apply in place of the provisions of this subsection.

(c) *Effective dates.*—The required publication or service of any substantive rule (other than one granting or recognizing exemption or relieving restriction or interpretative rules and statements of policy) shall be made not less than thirty days prior to the effective date thereof except as otherwise provided by the agency upon good cause found and published with the rule.

(d) *Petitions.*—Every agency shall accord any interested person the right to petition for the issuance, amendment, or repeal of a rule. (60 Stat. 238, 5 U. S. C. § 1003).

§ 10. Except so far as (1) statutes preclude judicial review or (2) agency action is by law committed to agency discretion.

(a) *Right of Review.*—Any person suffering legal wrong because of any agency action, or adversely affected or aggrieved by such action within the meaning of any relevant statute, shall be entitled to judicial review thereof.

(b) *Form and Venue of Action.*—The form or proceeding for judicial review shall be any special statutory review proceeding relevant to the subject matter in any court specified by statute or, in the absence or inadequacy thereof, any applicable form of legal action (including actions for declaratory judgments or writs of prohibitory or mandatory injunction or habeas corpus) in any court of competent jurisdiction. Agency action shall be subject to judicial review in civil or criminal proceedings for judicial enforcement except to the extent that prior, adequate, and exclusive opportunity for such review is provided by law.

(c) *Reviewable acts.*—Every agency action made reviewable by statute and every final agency action for which there is no other adequate remedy in any court shall be subject to judicial review. Any preliminary, procedural, or intermediate agency action or ruling not directly reviewable shall be subject to review upon the review of the final agency action. Except as otherwise expressly required by statute, agency action otherwise final shall be final for the purposes of this subsection whether or not there has been presented or determined any application for a declaratory order, for any form of reconsideration, or (unless the agency otherwise requires by rule and provides that the action meanwhile shall be inoperative) for an appeal to superior agency authority.

(d) *Interim relief.*—Pending judicial review any agency is authorized, where it finds that justice so requires, to postpone the effective date of any action taken by it. Upon such conditions as may be required and to the extent necessary to prevent irreparable injury, every reviewing court (including every court to which a case may be taken on appeal from or upon application for certiorari or other writ to a reviewing court) is authorized to issue all necessary and appropriate process to postpone the effective date of any agency action or to preserve status or rights pending conclusion of the review proceedings.

(e) *Scope of Review.*—So far as necessary to decision and where presented the reviewing court shall decide all relevant questions of law, interpret constitutional and statutory provisions, and determine the meaning or applicability of the terms of any agency action. It shall (A) compel agency action unlawfully withheld or unreasonably delayed; and (B) hold unlawful and set aside agency action, findings, and conclusions found to be (1) arbitrary, capricious, and abuse of discretion, or otherwise not in accordance with law; (2) contrary to constitutional right, power, privilege, or immunity; (3) in excess of statutory jurisdiction, authority, or limitations, or short of statutory right; (4) without observance of procedure required by law; (5) unsupported by substantial evidence in any case subject to the requirements of sections 1006 and 1007 of this title or otherwise reviewed on the record of an agency hearing provided by statute; or (6) unwarranted by the facts to the extent that the facts are subject to trial *de novo* by the reviewing court. In making the foregoing determinations the court shall review the whole record or such portions thereof as may be cited by any party, and due account shall be taken of the rule of prejudicial error. (60 Stat. 243, 5 U. S. C. §1009)

Appendix B.

The objectively ascertainable facts stated in the RCA Progress and Condon Reports—facts which were available to the Commission before the issuance even of its First Report—conflict in important respects with the fundamental findings upon which the Commission's Reports and order rests.

There is set forth below under the headings used in the basic findings of the Commission's First Report some of the conflicts between the Condon Committee Report and the RCA Progress Report on the one hand and the Commission's findings on the other. These conflicts were called to the attention of the Commission in the RCA Comments, which were submitted as part of the record prior to the Commission's order.

In its Petition of October 4, 1950, RCA offered to show to the Commission *nearly four months ago* the improvements made in the performance of the RCA system, with particular reference to those points about which the Commission expressed doubts in its findings.

	Condon Committee Report	RCA Progress Report	First Report of Commission
Description of Systems	"The effectiveness of channel utilization of the RCA color system is the highest of all the systems discussed in this report." (R. 370)		In spite of the Commission's statutory obligation to promote "the more effective" use of the radio spectrum, the Commission's Report did not even mention the relative effectiveness of channel utilization by the RCA and CBS systems.
	RCA is the only system which can make use of the mixed highs principle and its use has been conclusively proved to result in a saving of band width or space in the frequency spectrum. (R. 351-52, 362, 372)		The Commission's Report only stated that it was "claimed" that the use of mixed highs by the RCA system has saved band width. (R. 126) No reference was made to the fact that only the RCA system is able to make use of mixed highs.
	By the use of dot interlace, an integral part of the RCA system, "the resolution of the RCA image is approximately twice as great" as is possible on the same band width without dot interlace. (R. 365)		The Commission found only that RCA "endeavors" to save band space by the process of dot interlace. (R. 126)

	Condon Committee Report	RCA Progress Report	First Report of Commission
Evaluation of Systems (Flicker, motion continuity and allied effects)	Because of the difference between the field repetition rate of the CBS system and the RCA system, the RCA image can be about nine times as bright as the CBS image for equal visibility of large area flicker. (R. 360-61, 368)		This superiority of the RCA system over the CBS system in freedom from flicker was not mentioned.
	"... no adverse effects are noted" from the use of mixed highs. (R. 352)		The so-called "difficulty" which the Commission stated is encountered by the RCA system in maintaining adequate contrast in small areas the Commission said appears to be due, among other things, to the use of mixed highs. (R. 137)
(Brightness—Contrast)		RCA color system receivers utilizing tri-color tubes now produce pictures with highlight brightness of more than 20 footlamberts, and before long brightnesse of 40 to 50 footlamberts will be achieved. (R. 400)	"At none of the demonstrations on the record did any of the RCA color receivers produce sufficient illumination for ordinary home use" and "there is some doubt" whether the RCA system will permit much higher brightness [than 7 footlamberts] on the tri-color tube. (R. 137)

	Condon Committee Report	RCA Progress Report	First Report of Commission
(Color Fidelity)		A red phosphor of proper chromaticity has been developed. (R. 400)	The RCA tri-color tube "suffers from the limitations as to color fidelity which are involved in the use of color phosphors rather than filters." (R. 141)
	Fidelity of color reproduction depends upon what primaries are used and there is "no basic difference in the color fidelity of the three color systems". (R. 362)		This fundamental fact was not mentioned in the Commission's Report.
(Color Fidelity)	". . . no adverse effects" upon color detail results from the use by RCA of dot interlacing and mixed highs, and in particular the use of mixed highs does not result in "appreciable degradation of the color or tonal values of the image." (R. 352, 367)		The Commission asserted that because of RCA's use of mixed highs and the way it incorporates horizontal dot interlace, it appears that color detail in small areas of the picture cannot be faithfully produced. (R. 141)

	Condon Committee Report	RCA Progress Report	First Report of Commission
(Resolution)	"The RCA color image has an over-all resolution approximately equal to that of the black-and-white system". (R. 369)		The Commission found, with respect to the RCA system, that its resolution "even in theory is not equal to that of the present [black and white] system for all types of scenes." (R. 143)
		The resolution afforded by the tri-color tube has been increased because the number of phosphor dots has been increased from 351,000 to 600,000. (R. 400)	"As demonstrated [on April 6, 1950], the [RCA tri-color] tube had an inadequate number of dots." (R. 160)
(Picture Texture—Structural) (Brightness—Contrast)		Dot structure and moire pattern have been substantially eliminated due to use of improved receiver circuits and increased number of phosphor dots. (R. 400)	There was no demonstration by RCA of minimizing dot structure and "it appears to the Commission that if the dots are smoothed out, the consequences are likely to be a loss in resolution or contrast, or in both." The RCA tri-color tube "had a serious moire pattern in it". (R. 144, 153)

	Condon Committee Report	RCA Progress Report	First Report of Commission
(Adaptability and Convertibility)	"The black-and-white rendition of the RCA color transmission has higher resolution and better flicker-brightness performance" than does the black and white rendition of the CBS color system. (R. 368)		The Commission made no real distinction between the quality of the black and white rendition from the CBS color system on an adapted receiver and the black and white rendition from RCA color transmissions on a standard receiver. (R. 163-64)
(Equipment Considerations)		Receivers have now been developed incorporating new simplified and stable circuits. (R. 401)	The receiving equipment utilized by RCA is exceedingly complex and the Commission "is not satisfied that the [tri-color] tube solves the problem of complex receivers". Color controls are critical and not stable. (R. 152, 160)

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IN THE

Supreme Court of the United States

OCTOBER TERM—1950

No. 565

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., RCA VICTOR DISTRIBUTING CORPORATION, *et al.*,

Appellants,

against

UNITED STATES OF AMERICA, FEDERAL COMMUNICATIONS COMMISSION, and COLUMBIA BROADCASTING SYSTEM, INC.,

Appellees,

PILOT RADIO CORPORATION, *et al.*,

Intervenors-Appellants.

Appeal from the District Court of the United States for the Northern District of Illinois, Eastern Division

BRIEF FOR INTERVENOR-APPELLANT PILOT RADIO CORPORATION

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INDEX

PAGE

INTRODUCTION 1

POINT I—The order of the FCC violates the Commission's own standards and criteria, and is arbitrary, capricious, and against the public interest 2

POINT II—The correspondence between Senator Edwin C. Johnson and the FCC and CBS is relevant and material and should have been considered 11

CONCLUSION 14

Introduction

This brief is submitted on behalf of Pilot Radio Corporation (hereinafter referred to as "Pilot"), which was permitted by the statutory court below to intervene as a party plaintiff in the action herein (R. 791).

Pilot neither owns nor sponsors any color television system. Its interest in this controversy is that of a manufacturer of television sets. Like many others similarly situated, Pilot has been adversely affected by the order under review and will suffer irreparable harm unless the enforcement and execution of such order is enjoined (R. 450-458).

Pilot is heartily in favor of color television. Aside from purely aesthetic considerations, color television, as a source of new and expanded public interest, provides a desirable field for commercial development. Pilot, however, is not in favor of foisting upon the public an unsatisfactory and inferior system of color television, which will cause the wasteful and unnecessary expenditure of millions of dollars by the public, force a regression of the high standards already achieved in television and result in a disastrous retardation of the nation's substantial television industry. That is precisely the inevitable effect of the order of the Commission.

Inasmuch as the brief for appellants Radio Corporation of America, National Broadcasting Company, Inc. and RCA Victor Distributing Corporation sets forth in detail the opinions below, the jurisdictional basis of the review herein, the statutes involved and other basic information from the record, reiteration here would be superfluous. Accordingly, this brief will be limited to a discussion of the reasons which, it is submitted, establish the illegality of the order in question.

POINT I

The order of the FCC violates the Commission's own standards and criteria, and is arbitrary, capricious, and against the public interest.

Although the literal text of the order under review does not refer to the CBS incompatible color system, its conceded effect and purpose is the approval of that system. Once before, in 1947, the Commission had occasion to consider the CBS system.* In a report issued on March 18, 1947 (R. 458), the Commission rejected that system. In doing so, certain criteria for the protection of the public were laid down as the *sine qua non* for the approval of any color system. The Commission stated:

> "It is obvious that before permitting a new television service to become established on a regular basis, a decision must first be made on fundamental standards. Otherwise, manufacturers of receivers could not start to build receivers, and the public could not purchase receivers with any confidence that they would be able to receive programs from all television stations, or that their receivers would not become useless immediately after they were purchased if the existing stations should change any of the fundamental standards. Under these conditions, it is entirely unlikely that television receivers would be bought on any mass basis.
>
> "Before approving proposed standards, the Commission must be satisfied not only that the system proposed will work, but also that the system is as good as can be expected within any reasonable time in the foreseeable future. In addition, the system should be capable of permitting incorporation of better performance characteristics without requir-

* The present CBS system is basically the same except that the field sequential system of 525 lines has been replaced by the present 405 lines.

> ing a change in fundamental standards. Otherwise, the danger exists that the standards will be set before fundamental developments have been made, with the result that the public would be saddled with an inferior service, if the new changes were not adopted, or if they were adopted, receivers already in the hands of the public would be rendered useless."

This was a reaffirmation of the basic principles enunciated and followed by the Commission from the very outset. Thus in 1940, when the Commission refused to authorize commercial broadcasting of black and white television, it stated (R. 563-564) that transmission standards must "assure to the public in basic outline a single uniform system of broadcasting which will enable every transmitting station to serve every receiver within its range." Further, "In its regulation of television in the public interest, the Commission, in the light of the evidence before it, has set as its goal unfettered technical development and engineering advance. In dealing with the problem of setting television transmission standards the Commission has, therefore, sought to avoid action which would freeze the state of the art at an unsatisfactory level of performance." Again, "However, a serious question of public interest would arise in the future if the Commission should specify external transmitter performance capabilities differing from the operating capabilities of receivers in the hands of the public. This is because of the resultant possibility that the public's receivers would be incapable of receiving programs emanating from transmitters licensed by the Commission."

In view of the foregoing, the issuance and publication on September 1, 1950, of the Commission's so-called "First Report on Color Television Issues," FCC 50-1064 (R. 95-288) came as a bombshell to the television industry. That report is the ostensible basis for the order now under attack

and contains a summary by the Commission of the hearings held and the Commission's findings and conclusions.

The Commission itself chose to predicate its action on the contents of that report. A reading thereof, however, establishes, without more, that the Commission has acted arbitrarily, unreasonably and unlawfully. It is clear therefrom that the Commission had predetermined the issues and decided, in contravention of its own criteria and principles, to approve the CBS color system.

The CBS system is an incompatible system, so that existing sets can receive no picture whatsoever from CBS color transmission without the addition of an adapter (R. 147). The Commission, therefore, must have recognized that the CBS system did not comply with one of the conditions it had prescribed when the instant hearings on color were initiated. These hearings were commenced pursuant to the Commission's Notice of Further Proposed Rule Making, of July 11, 1949 (R. 26, 112). That notice stated that the Commission proposed to consider changes in transmission standards looking toward color television or other television systems, but only upon a showing that:

> "1. Such system can operate in a 6-megacycle channel; and
>
> 2. Existing television receivers designed to receive television programs transmitted in accordance with present transmission standards will be able to receive television programs transmitted in accordance with the proposed new standards simply by making relatively minor modifications in such existing receivers."

Obviously, more than "relatively minor modifications in existing receivers" would have to be made if the CBS color system were adopted.

Confronted with the clear and unambiguous requirements so recently laid down by itself on July 11, 1949, the

Commission could not in so many words repudiate or disregard the same. Instead, the Commission first contended that the scope of the language was not clear (Par. 102),* a ridiculous position for the author thereof to take. Finally, in the statement of minimum criteria contained in its general conclusions, the Commission omitted the aforesaid requirement upon which the hearings had been initiated (Par. 122).

There were other hurdles and unresolvable dilemmas. The CBS color system had been previously considered by the Commission and, as aforestated, rejected in a report issued on March 18, 1947. The system so rejected in 1947 was substantially the same system considered by the Commission in its latest hearings, and approved on October 10, 1950. The only difference is that the system rejected in 1947 was a better system than the presently approved CBS system in that the earlier one used a field sequential system of 525 lines making for a higher picture detail than that afforded by the present 405 lines (Par. 90; R. 575).

The reasons for rejecting the CBS system in 1947 applied with even greater force to the CBS system presented in its 1949-50 hearings. In 1947 the Commission stated that the CBS standards had failed to meet the test prescribed by the Commission, namely that the system be "as good as can be expected within any reasonable time in the foreseeable future" and "should be capable of permitting incorporation of better performance characteristics without requiring a change in fundamental standards. Otherwise, the danger exists that the standards will be set before fundamental developments have been made with the result that the public would be with an inferior service, if the new changes were not adopted, or if they were adopted, receivers already in the hands of the public would be rendered useless."

* Parenthetical citations of paragraphs refer to the numbered paragraphs of the Commission's Report of September 1, 1950, found at R. 95-288.

The Commission found in 1947 that the CBS standards did not "represent the optimum performance which may be expected of a color television system within a reasonable time" (R. 462). At the time of the report of the Commission on September 1, 1950 this was truer than ever. For at that time the industry had already brought to the Commission's attention several developments of large significance, the perfection of which could reasonably be expected in the foreseeable future. Thus the Commission pointed out, among other things, that

> "Two developments were demonstrated in this hearing which hold real promise for increasing definition both in color and black and white pictures. One is horizontal interlace and the second is the efficacy of long persistence phosphors in reducing flicker, thus providing the means for decreasing the field rate and increasing the number of lines in the picture. Both of these techniques require further testing and, if successful, may make desirable additional changes in the field and line repetition rate." (Par. 147)

In addition, the tri-color tube being developed by RCA held large promise for significant use in color systems (Pars. 53, 60). These developments and improvements however either could not be utilized in connection with the CBS system (see, *e.g.*, Par. 75), or the possibility of such use had not yet been ascertained (see, *e.g.*, Par. 86). Moreover, with respect to a number of pertinent factors relating to color, the Commission was forced to concede that more information was needed and further time required for additional testing (see comments in Exhibit E, annexed to Pilot's intervening complaint; also Par. 100). Serious deficiencies in the CBS system were also acknowledged, such as the inferior geometric resolution of the CBS picture (Par. 94). The degraded black and white picture received from the CBS color transmission is due to the fact that the CBS system produces 405 lines per picture as com-

pared with the 525 lines per picture in the present monochrome system (Par. 90). The CBS system is accordingly susceptible to greater flicker than in the present monochrome system (Par. 142). More serious perhaps, than any of the foregoing, is the fact that the CBS system, as a practical matter, is limited to a picture of no greater size than 12½ inches, although the tendency of the public, as the Commission stated, is to purchase sizes larger than 12½ inches (Par. 144). The fact is that the public purchase of receivers of 12½ inches in size or less has been practically nonexistent. The Commission also realized, and so stated, that a satisfactory compatible system is preferable to an incompatible system such as the CBS color system. "Compatibility would facilitate for the broadcaster the transition from black and white broadcasting to color broadcasting and would reduce to a minimum the obsolescence problem of present receivers" (Par. 123). As contrasted with the limitations and deficiencies of the CBS system, compatible systems had already revealed high promises for the near future.

Since the Commission recognized "the possibility of new color systems and improvements in existing color systems" (Par. 148) it was required to afford adequate time for the full exploration thereof. Otherwise, in its own words, the danger existed that standards would be set before fundamental developments had been made "with the result that the public would be saddled with an inferior service." Commissioner HENNOCK in her concurring opinion to said report recognized the need for affording such additional time and stated:

> "* * * Still, the improvement which took place during the course of the hearings, a relatively short time when compared to the previous course of television development, was impressive. There are many indications that intense effort is being exerted to overcome the difficulties inherent in compatible color

> systems. Off-the-record developments by Hazeltine, General Electric, Color Television, Inc., and RCA may be bringing us a little closer, if not near, to the realization of a practical compatible color system. In any event we should work toward that end with all our energy until the last possible moment, and not foreclose the possibility of its achievement until convinced that it is a practical impossibility" (R. 190).

The obvious, practical and only reasonable course of action under the circumstances was to wait until these developments either were perfected, or, after lapse of a reasonable time, found to be unworkable before any new standards were adopted. The Commission, however, was apparently bent on approving the CBS system. It needed an ostensible excuse for its action. This was provided by a self created problem. Simply stated, the Commission expressed the fear that because of the over increasing number of black and white sets being produced, the number of additional adapters and converters which would have to be added in the event an incompatible system were ultimately adopted constantly increased. The expressed fears of the Commission in this respect, however, are misleading. The Commission's own chairman has indicated that it will cost no more to adapt an existing black and white receiver than it would to build new receivers providing for such adaptation (Exhibit E, annexed to Pilot's intervening complaint, R. 482).

The imaginary horror of aggravating the "problem" of incompatibility caused the Commission to pose the following dilemma:

> "Thus two difficult courses of action are open to the Commission. The first course of action is to reopen the record and to have a demonstration on the record wherein a tri-color tube or other technique for displaying large size direct-view pictures could

be tried out on the CBS system. The second course of action is to adopt a final decision now promulgating color standards on the basis of the CBS system with the confidence that since the radio industry has succeeded in creating much larger tube sizes than those demonstrated in 1941 when standards for black and white television were adopted, they would succeed in building apparatus that would eliminate the present limitation in the CBS system as to size of direct view tube (Par. 145).

"The advantage of the first course of action is that the Commission would not be compelled to speculate as to an important basis for its decision but would have a definitive answer on the basis of which to act. * * * The advantage of the second course of action is that it would bring a speedy conclusion to the matters in issue and would furnish to manufacturers a real incentive to build a successful tri-color tube as soon as possible. The disadvantage is that the Commission's determination on an important part of its decision would be based on speculation and hope rather than on demonstrations" (Par. 146).

The answer that the Commission gave to the self-created problem was ingenious. The Commission stated that it would postpone a decision on color if the television manufacturing industry gave it certain requested assurances in order to maintain the *status quo* on compatibility. The manufacturers were requested to assure the Commission by September 29, 1950, that they would shortly commence the manufacture of receivers incorporating certain bracket standards enabling the reception in black and white of the CBS color transmission. If the manufacturers did not provide such assurances, the Commission stated that it would then immediately adopt the CBS system.

As the Commission undoubtedly must have known and expected, the condition prescribed for deferring a decision

on color could not be complied with by the television industry. Firstly, it was physically impossible to build sets capable of operating under the proposed standards within the time limits prescribed by the Commission. Secondly, the "reward" offered for complying with the Commission's request was illusory in that the time proposed for further exploration of compatible systems was wholly inadequate. The Commission's request of the manufacturers was unacceptable for a variety of other reasons, some of which are elaborated upon in Exhibit E annexed to Pilot's intervening complaint (R. 475-482).

As expected, the manufacturers refused to extend the requested assurances. The Commission then approved the CBS system. This was obviously its intention from the outset. If the CBS system were worthy of acceptance, it should have been accepted on September 1, 1950. If it were not worthy of acceptance on September 1, 1950, it should not have been approved on October 10, 1950. The Commission's ready seizure upon the industry's refusal to agree to an unacceptable condition could only have been intended to obscure the weakness of the Commission's predetermined approval of the CBS color system. The report of September 1st, stripped of garnishment, clearly shows that the Commission predicated its action solely on "speculation and hope." This is not a legally supportable basis for the order under review.

POINT II

The correspondence between Senator Edwin C. Johnson and the FCC and CBS is relevant and material and should have been considered.

The action of the Commission in approving the CBS color system, under the circumstances then obtaining, has necessarily given rise to a number of pertinent questions. Why, for example, the precipitate haste in adopting the CBS system? Why was not further time permitted for perfection and demonstration of other systems? Why did the Commission disregard and drastically depart from statutory standards and its own carefully considered oft-repeated criteria, standards and principles? These and many other pertinent questions are unanswered on the record. If considerations dehors the record induced the Commission to act as it did, such considerations should be brought to light so that the order in question may be properly evaluated in its true perspective. Only in that manner can an otherwise inexplicable action be explained and hence understood and appraised.

The exchange of correspondence between the FCC, CBS and United States Senator Edwin C. Johnson and the latter's public utterances on color television shed considerable light in this respect. Senator Johnson is and has been during the period in question Chairman of the Senate Committee on Interstate and Foreign Commerce. This is the Committee which is concerned, among other things, with matters pertaining to radio and television, which has the veto power over appointments and reappointments to the FCC and which is in a position to influence appropriations for the Commission. As a result it has a life-and-death hold on the FCC. Under these circumstances, it is unrealistic to expect that constant and vigorous pressure exerted by the Chairman would be ignored.

By subpoena *duces tecum*, Pilot called upon CBS and the FCC to produce at the hearing before the statutory Court below all of their correspondence with Senator Johnson relating to color television (R. 515-517). Such correspondence was produced pursuant to said subpoena but the defendants' motion to quash the subpoena was thereafter granted (R. 873-874). We submit that the production of the documents in question was properly required and that the documents were relevant and material and should have been considered.

The correspondence in question and the public statements of Senator Johnson, which are within the judicial cognizance of the Court, clearly establish a course of conduct calculated to influence the Commission's ultimate determination on color television. The correspondence in question is in the record (R. 797-863; fols. 1172ff., unprinted) and accordingly only brief reference thereto is necessary here to establish the purport thereof.

As far back as May 1949, Senator Johnson indicated that he was dissatisfied with the Commission's reluctance to authorize commercial licensing of color because of the Commission's belief that color television had not been developed fully for the promulgation of minimum standards (Letter of Senator Johnson to Dr. Condon, Director, National Bureau of Standards, copy of which is annexed to the complaint of RCA herein). On August 22, 1949, after witnessing a CBS color demonstration, Senator Johnson wrote to Dr. Frank Stanton, President of the Columbia Broadcasting System, that (R. 841):

> "It was a magnificent and utterly convincing proof that color television is here now, and that all that is necessary for it to sweep the nation is for the Federal Communications Commission to remove the road block and promulgate standards for its operation."

Simultaneously therewith, Senator Johnson wrote to Vice Chairman Paul Walker of the FCC to the same effect and stated that it was "contrary to the laws of progress for the Commission to wait until color television is perfect before it approves standards. That sort of reasoning may be logical in a totalitarian or corporate state; it is nonsense in a free enterprise economy such as ours" (R. 843).

A copy of Senator Johnson's letter to Dr. Stanton and Vice Chairman Walker was concurrently sent to Commissioner Jones of the FCC (R. 840).

The implications intended by the foregoing were unmistakable. Senator Johnson as Chairman of the Commerce Committee wanted the CBS color system approved by the FCC without further delay even though it was not perfected and even though converters and adapters would have to be added to existing sets in order to obtain color reception.

This strong advocacy of the CBS system was made at a time which immediately preceded the formal record hearings of the Commission and before the Commission was able to witness an on-the-record demonstration by any of the proponents of color television systems (see Pars. 24-25).

On November 12, 1949, in a letter to the Chairman of the FCC, Senator Johnson wrote further that "compatibility, while desirable, certainly should not be the primary basis for a decision" on color, and he expressed his "earnest hope" that the FCC would quickly promulgate standards for color (R. 845-846). In this connection, it should be noted that of the three systems presented for the Commission's consideration, CBS, RCA and CTI, only the CBS system was an incompatible one.

We do not impute or intend any reflection on the personal integrity of Senator Johnson. Regardless, however,

of his good intentions, the fact remains that his prodding, cajoling and demands culminated in action by the Commission which:

ran contrary to its own criteria;

attempted to control the television industry by threats;

approved a color system which is not as good as that which may be expected in the foreseeable future;

disregarded impending improvements and developments which were called to its attention;

disregarded the need for further testing and demonstration;

created an unfounded fear of incompatibility;

disregarded the best engineering advices of almost an entire industry;

paid no heed to the findings of the impartial Condon Committee;

based its decision not on substantial evidence but rather on speculation and hope; and

seeks to saddle the industry and the public with an inferior service, a regression of standards and a wasteful and unnecessary expenditure of millions of dollars.

CONCLUSION

Pilot Radio Corporation respectfully submits that it is clear from the record herein that the order of the FCC was arbitrarily and capriciously adopted in disregard of the public interest. That order should be set aside and the enforcement thereof enjoined so that an opportunity may be given for proper consideration of a perfected compatible system of color television.

Respectfully submitted,

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Supreme Court of the United States

OCTOBER TERM 1950

No. 565

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., RCA DISTRIBUTING CORPORATION, *et al.*,

Appellants.

against

UNITED STATES OF AMERICA, FEDERAL COMMUNICATIONS COMMISSION, and COLUMBIA BROADCASTING SYSTEM, INC.,

Appellees.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES FOR THE NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION.

BRIEF FOR APPELLANT EMERSON RADIO AND PHONOGRAPH CORPORATION

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Counsel for Appellant Emerson Radio and Phonograph Corporation

March 26, 1951.

INDEX

	PAGE
OPINIONS BELOW	1
JURISDICTION	2
STATUTES INVOLVED	2
QUESTIONS PRESENTED	2
STATEMENT	2
THE SPECIAL INTEREST OF EMERSON	2
SPECIFICATION OF ERRORS	7
ARGUMENT	7
Introductory	7
I. The District Court Erred	10
II. The Commission's Order Is Invalid	17
CONCLUSION	33

CASES CITED

Arnstein v. *Porter*, 154 F (2) 464, 468 (CCA 2, 1946)	11
Associated Industries v. *Ickes*, 134 F (2) 694, 704 (CCA 2, 1943)	6
Associated Press v. *United States*, 326 U. S. 1, 6 (1945)	11
Brown v. *Fletcher*, 237 U. S. 583, 587 (1915)	16
Ex Parte Harley-Davidson Motor Co., 259 U. S. 414, 417-418 (1922)	16
Federal Communications Commission v. *WJR*, 337 U. S. 265 (1949)	15
Federal Communications Commission v. *Sanders Brothers Radio Station*, 309 U. S. 470 (1940)	6
Lamar v. *United States*, 241 U. S. 103, 110 (1916)	16
Lutcher & Moore Lumber Co. v. *Knight*, 217 U. S. 257, 267 (1910)	16

PAGE

Marconi Wireless Telegraph Co. v. *Simon*, 246 U. S. 46, 57 (1918) 16
McCardle v. *Indianapolis Water Co.*, 272 U. S. 400, 424-425 (1926) 16
Moffat Tunnel League v. *United States*, 289 U. S. 113, 120 (1933) 6
National Labor Relations Board v. *Pittsburgh S. S. Co.*, 337 U. S. 656 (1949) 14
Oklahoma Natural Gas Co. v. *Russell*, 261 U. S. 290, 293 (1922) 15
Scripps-Howard Radio, Inc. v. *Federal Communications Commission*, 316 U. S. 4 (1942) 6
Securities and Exchange Commission v. *Chenery Corp.*, 318 U. S. 80, 94 (1943) 29
United States v. *Carolina Freight Carriers Corporation*, 315 U. S. 475, 489 (1942) 16, 29
United States v. *Interstate Commerce Commission*, 337 U. S. 426 (1949) 15
William Cramp & Sons Co. v. *International Curtiss Marine Turbine Co.*, 228 U. S. 645, 647, 648-9 (1913) 16
Yonkers v. *United States*, 320 U. S. 685 (1944) 29

STATUTES CITED

Administrative Procedure Act
60 Stat. 239 (1946); 5 U. S. C. § 1003(b) 11
60 Stat. 243 (1946); 5 U. S. C. § 1009 16
Communications Act of 1934
48 Stat. 1082 (1934); 47 U. S. C. § 303(e) 29, 30
48 Stat. 1093 (1934), 63 Stat. 108 (1949); 47 U. S. C § 402(a) 2, 6
48 Stat. 1093 (1934); 47 U. S. C. § 402(b) 6
Judicial Code
28 U. S. C. § 1253 (1948) 2, 6
28 U. S. C. § 2101(b) (1948) 2
28 U. S. C. § 2323 (1948) 6
Federal Rules of Civil Procedure, Rule 56 10

Supreme Court of the United States

OCTOBER TERM 1950

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., RCA VICTOR DISTRIBUTING CORPORATION, *et al.*,
Appellants,

against

UNITED STATES OF AMERICA, FEDERAL COMMUNICATIONS COMMISSION, and COLUMBIA BROADCASTING SYSTEM, INC.,
Appellees.

No. 565

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES FOR THE NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION.

BRIEF FOR APPELLANT EMERSON RADIO AND PHONOGRAPH CORPORATION

This is an appeal by intervening plaintiff, Emerson Radio and Phonograph Corporation (hereinafter referred to as Emerson) from a final judgment entered on December 22, 1950, of the United States District Court for the Northern District of Illinois, Eastern Division, dismissing the complaint in this suit on a motion for summary judgment.

Opinions Below

The majority and dissenting opinions of the District Court (R. 863-881) are not yet reported.

Jurisdiction

The jurisdiction of this Court is invoked under the provisions for direct appeal, Title 28, U. S. C., §§ 1253 and 2101(b), made applicable by § 402(a) of the Communications Act of 1934 as amended (48 Stat. 1064, 1093, 63 Stat. 108; 47 U. S. C. § 402(a)). The orders appealed from (R. 882, 883) were entered December 22, 1950 and January 23, 1951, and the appeal was allowed (R. 892) on January 25, 1951. This Court noted probable jurisdiction on March 5, 1951.

Statutes Involved

The relevant statutes, to which reference will be made, appear in Appendix "A" to the RCA brief. The Regulations involved appear at R. 432-434.

Questions Presented

The questions presented are set forth in the Jurisdictional Statement at pp. 9-11, and are not repeated here.

Statement

The basic facts are covered in the briefs of appellants, including particularly Radio Corporation of America (hereinafter referred to as "RCA"). We shall try to avoid repetition.

The Special Interest of Emerson

Emerson is a leading producer of radio and television receiving equipment. Over half a million of Emerson's television receivers were in use by the public at the time of

the hearing below and this number is being increased by a sales volume of approximately forty thousand per month (R. 538).

Emerson's business reputation and the public confidence which it has established in the standard of quality of its products would be seriously impaired if it should be compelled to offer to the public the substandard equipment required by adherence to the CBS standards.

Although the Commission's Order of October 10, 1950 is not yet in effect, its harmful impact upon Emerson has already become evident. Between October 10, 1950, when the Order was issued, and November 9th, when the pleading in intervention was verified, Emerson had suffered a 60% drop in its backlog of unfilled orders (R. 541).

The system of color television—the CBS system—which the Commission has adopted is one which is incompatible, *i.e.*, existing television sets cannot pick up television broadcasts made on the CBS system.

There are presently more than ten million receivers of all makes in the hands of the public and this number is constantly increasing. The owners of these sets will not be able to receive programs broadcast by the CBS color system. If they add an "adapter" in the form of certain additional wire circuits to their sets they will be able to receive such programs, but only in black and white. If they also add a "converter" in the form of a mechanical, whirling color wheel, they will be able to receive CBS broadcasts in color.

The exact cost of these adapters and converters is, of course, unknown because they are commercially unavailable at the present time; indeed, commercially undesigned at the present time. The Commission itself accepted estimates of

from $95 to $130 for adapting and converting a 7 inch set and proportionately higher figures for larger sets (R. 148). After incurring this expense, which may amount to half again the original cost of the receivers, the television set owners will be able to receive the color broadcasts transmitted by the CBS system.

There are certain grave limitations inherent in this system. For the present at least, the CBS system is limited to projection receivers or to direct view tubes of 12½ inches or less in size. Another limitation is that the CBS system has less "geometric resolution" than the present black and white system. In addition, there are certain deficiencies in the CBS system due to color breakup and color fringing.

Emerson's reputation and good will are bound to suffer impairment if, in consequence of the Order, Emerson should be obliged to offer to its customers television receivers, adapters and coverters, which have not yet been commercially designed, and which if manufactured will rapidly become obsolete. Implicit in the Commission's Report is the finding that the mechanical color disc therein authorized and approved will soon be superseded by an electronic color tube (R. 164-165).

As a manufacturer of television sets from the very beginnings of the industry, Emerson has been able to forge to the front rank because of its ability to judge the direction of public taste and its capacity to satisfy the public demand at a price the public is willing to pay.

In the judgment of Emerson, the television audience will be discontented with the decline in picture definition which the Commission found to be inherent in the CBS system. Nor will the public be content with a picture limited to 12½ inches. The trend in the industry has

moved rapidly in the direction of larger picture size. So marked has been that trend that at the time of filing its pleading below Emerson planned, by the end of the year 1950, to abandon general production of any models under 16 inches in size (R. 540).

In Emerson's considered view, its customers will resent the need of adding further expensive equipment to its presently outstanding sets. Should Emerson, impelled by competitive necessity, put its trade mark on these deficient wares, it will necessarily suffer a blow to its good will and reputation. Furthermore, in view of the obsolescent character of the CBS system, Emerson will face an inventory loss and a loss on its commitments for parts necessary to install the adapters and color wheels in receivers. This loss will be larger or smaller depending on the manufacturer's skill or good luck in guessing the precise moment when these parts will take their place as the museum pieces of a rapidly expanding art.

The injury thus inflicted upon the manufacturer will to a very large degree likewise be inflicted upon the public. The 10,000,000 existing television set owners have by their investment of over $2,000,000,000 created the audience which, through advertising, has financed the phenomenal growth of television and indeed made possible the present expansion into color. By the introduction of an incompatible color system, these owners will be excluded from a portion of the available broadcast service unless they spend a large sum of money, encumber their sets with short-lived gadgets, and expose their sets to the service of personnel as yet untrained in the conversion operation. And these burdens must, however unjustifiably, hurt the good will of the manufacturers who sold the public their sets

upon the mutual supposition that the sets would make available to the buyer—at least in black and white—all commercial television programs.

Emerson has no interest in either the CBS or the RCA system as such. Emerson does have an interest in making certain (a) that the Commission will not adopt a color system that will render obsolete the millions of televisions sets now in the hands of the public, including the hundreds of thousands of such sets heretofore purchased from Emerson; (b) that the Commission will not adopt any color systems until the art has been sufficiently perfected and stabilized so that the customers who buy color television sets from Emerson will not find those sets obsolete in the near future; and (c) that if action be taken now, in the immature stage of the art, then at least the Commission will not, by imposing only one system of color television, prevent the improvement and development of color television that may be expected from competition between two or more co-existing systems of color television.*

To protect these interests, Emerson sought and obtained leave from the District Court to intervene (R. 791). It is thus a proper party appellant (28 U. S. C. § 1253).

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*In these senses, Emerson may perhaps be deemed to be acting as a sort of "private attorney general" in the public interest. "Such persons, so authorized are, so to speak, private Attorney Generals." Frank, C. J., in *Associated Industries* v. *Ickes*, 134 F (2) 694, 704 (CCA 2, 1943); cf. *Federal Communications Commission* v. *Sanders Brothers Radio Station*, 309 U. S. 470 (1940); *Scripps-Howard Radio, Inc.* v. *Federal Communications Commission*, 316 U. S. 4 (1942). The wide scope of standing to appeal from Commission action with respect to its licensing power (48 Stat. 1093; 47 U. S. C. § 402(b)) is paralleled by equally liberal status where the issue involves attack on other orders (like the one here) of the Commission described in 47 U. S. C. § 402(a). See 28 U. S. C. § 2323. In *Moffat Tunnel League* v. *United States*, 289 U. S. 113, 120 (1933) the court said that those mentioned in the statute (e.g. "corporations") "who are interested in the 'controversy or question' in any suit brought by anyone . . . may intervene at any time after institution of the suit . . ."

Specification of Errors

The District Court erred:

1. In granting summary judgment and in holding that it was without power to consider evidence submitted to it for the purpose of determining whether such evidence should have been considered by the Commission.

2. In failing to pass on many of the important issues presented to it for determination.

3. In failing to hold that the order of the Commission is contrary to law and is not supported by the Commission's conclusions, by its findings or by substantial evidence.

4. In failing to hold that the refusal of the Commission to permit the commercial broadcasting of compatible color television systems in competition with incompatible color systems exceeds the Commission's lawful jurisdiction and is not supported by the Commission's conclusions or its findings.

For a full listing of the errors specified on this appeal, the Court is respectfully referred to the appellants' Assignment of Errors (R. 886).

ARGUMENT

Introductory

The orders of the Commission as well as the judgment of the court below are both the products of an avowed preference for haste over discretion:

(1) The Commission, made aware that rapid and revolutionary changes were taking place in the art of color television, was confronted by the need of making a choice between two difficult courses: to learn the facts or to plunge blindly. (First Report § 146, R. 165). In one of the most amazing confessions in the annals of administrative regulation, the Commission announced that it preferred to plunge blindly.

(2) The Court below also deemed itself confronted by a choice between two courses: to grant summary judgment for defendants or to send the proceeding back to the Commission for an evaluation of the changes in the art and in the economic situation (R. 875). Acknowledging that it was moved by considerations of *speed*, the Court chose the former.

Undoubtedly there are emergencies in the administration of human affairs when time is of the essence and decision cannot wait upon mature investigation and deliberation. Undoubtedly administrative agencies are occasionally called upon to make decisions upon matters so trivial and transient that a hasty judgment is all they deserve.

Under review upon this appeal, however, is an administrative order which establishes the gauge for the electronic highways upon which color television must travel. Once established it can no more readily be changed than the gauge of United States railway trackage. Billions of dollars will be spent to accommodate broadcasting and receiving equipment to the new requirements. Surely an order which is to be effective for generations, which will exact so heavy a toll from the public and which is bound to affect for good or ill a new and fecund art, is entitled to be fathered by the fullest information, and to undergo the maximum gestation of reflective deliberation.

The addition of color to the television broadcast is after all but an attractive amenity. It will probably not usher in the millenium; and even if it were the harbinger of everlasting bliss, would it not have been wiser to wait a few months for the most up-to-date bliss, with the latest improvements?

It is a cliché of administrative law that the courts will not appraise the wisdom of agency action. This generalization has its bounds. When the administrative decision departs so far from familiar wisdom that it is no longer consonant with common sense, the courts do not hesitate to denominate the decision arbitrary and to knock it down.

We submit that the Orders here under review defy common sense.

The two Reports of the Commission disclose, though but partially and faintly, the essential fact distilled from the long record made during the administrative proceeding: that the science and art of color broadcasting is in a state of explosive inventiveness. So rapid was the rate of change that by the time the hearings closed, the evidence received in its opening weeks seems already to have acquired an archeological patina. By the time the orders were made, the Commission was informed that the current facts had already left the closing days' evidence far behind them.* For any agency, under such circumstances, to congeal the standards and methods of color broadcasting, to make it available only to obsolete 12½ inch receivers, to encourage the manufacture of an obsolescent mechanical color disc, to close its ears to the voice of the affected industries and dispassionate scientists alike, to keep in tune with the views

*Newspaper reports indicate that the rate of change has continued.

of only one—the champion of the CBS system—we submit, is to fall beyond the pale of prudence or common sense. A decision so shaped cannot be justified merely by an obsession that color must be inaugurated now—on November 20—the "magic date", as Judge Major called it.

Against this background we make our argument on the errors we have assigned.

I. THE DISTRICT COURT ERRED IN THAT:

(a) THE DISTRICT COURT GRANTED SUMMARY JUDGMENT DISMISSING THE COMPLAINT, NOTWITHSTANDING THE EXISTENCE OF AN ISSUE OF FACT AS TO WHETHER THERE HAD BEEN SUCH DEVELOPMENTS IN THE PERFECTION OF COLOR TELEVISION AFTER THE HEARINGS WERE CLOSED IN MAY, 1950 THAT THE COMMISSION ABUSED ITS DISCRETION IN REFUSING TO TAKE EVIDENCE AS TO THOSE DEVELOPMENTS;

(b) THE DISTRICT COURT DID NOT GRANT APPELLANTS THE STATUTORY REVIEW TO WHICH THEY WERE ENTITLED, BUT DECIDED THE CASE PRO FORMA IN THE INTERESTS OF OBTAINING AN EARLY DECISION BY THIS COURT.

(a)

It is our contention that the drastic remedy of summary judgment was unavailable on the state of the record in the District Court. Rule 56 of the Federal Rules of Civil Procedure authorizes summary judgment without trial if it appears that "there is no genuine issue as to any material fact and that the moving party is entitled to a judgment

as a matter of law." Summary judgment is not to be granted where there is "the slightest doubt as to the facts." (*Arnstein* v. *Porter*, 154 F (2) 464, 468, CCA 2, 1946). And this Court has said:

> "We agree that Rule 56 should be cautiously invoked to the end that parties may always be afforded a trial where there is a bona fide dispute of facts between them * * *". *Associated Press* v. *United States*, 326 U. S. 1, 6 (1945).

One of the issues before the District Court was whether the Commission had abused its discretion in refusing to consider changes and improvements in the television art developed during and after the close of its hearings in May, 1950. Plaintiffs urged on the District Court that the Commission had not complied with its statutory duty to consider, in its rule making, "all relevant matter presented" (60 Stat. 238; 5 U. S. C. § 1003(b)). The Commission had been asked to consider certain matters showing the tremendous improvements made in the RCA system during and after the close of the hearings. The Commission refused to inform itself of these improvements, which, it conceded, were a daily occurrence in this dynamic field (R. 411).

The resolution of the issue thus presented called for an evaluation of facts. If these improvements were of trifling significance, the Commission's discretion was not abused. If the improvements were substantial or revolutionary, its discretion might well be said to have been abused. The Court should not have foreclosed the plaintiffs from proving that the latter was the case.

The District Court recognized the force of our complaint in this respect. It conceded that "much progress was made during the latter portion of the hearings and . . .

after the hearings closed, in the development of a compatible system of color television", and said that "as we view the situation the most plausible contention made by plaintiffs is that the Commission abused its discretion in refusing to extend the effective date of its order so that it might further consider the situation, and particularly the improvement which it is claimed had been made by RCA and others".

Nevertheless the District Court held that "there is no evidence . . . which this court could properly hear . . . for the purpose of showing current developments . . . which have been called to the attention of the Commission and which it refuse[d] to consider . . . We reiterate that . . . our function is to hear and determine the questions before us solely on the record made before the Commission . . ." So the Court denied to us the opportunity to show to it evidence which we believe—and the court inferentially assumed—it was erroneous for the Commission to ignore.

In the determination of the issue of whether the Commission abused its discretion by refusing to reopen the record for the purpose of considering new evidence, the Court was obviously not bound by the record thus claimed to be improperly closed. It was bound to examine the facts whose rejection plaintiff claimed to be an abuse of discretion.

The denial of summary judgment would not have required a trial *de novo* of the merits of the several systems. It would merely have afforded plaintiffs the opportunity to show that the changes were of such an order of magnitude that the Commission should not have taken final action without evaluating them.

(b)

The District Court failed to grant appellants the judicial review which the cause required. This clearly appears from the following portions of the opinion of the majority:*

> "After listening to many hours of oral argument by able counsel representing the respective parties, we formed some rather definite impressions relative to the merits of the order, as well as the proceedings before the Commission upon which it rests. And our reading and study of the numerous and voluminous briefs with which we have been favored have not altered or removed those impressions. Also, in studying the case, we have b n unable to free our minds of the question as to *why we should devote the time and energy which the importance of the case merits*, realizing as we must that the controversy can only be finally terminated by a decision of the Supreme Court. This is so because any decision we make is appealable to that court as a matter of right and we were informed during oral argument, in no uncertain terms, that which otherwise might be expected, that is, that the aggrieved party or parties will immediately appeal. In other words, *this is little more than a practice session* where the parties prepare and test their ammunition for the big battle ahead."
>
> * * * * *
>
> "Thus, as we evaluate the situation, there are two courses open, (1) to allow defendants' motion for a summary judgment, and (2) to vacate the order and send the proceeding back to the Commission for further consideration in view of recent developments in the color television field as well as the rapid

*R. 863, 866, 875.

> changing economic situation. A pursuance of the latter course, assuming we have such authority, of which there may be doubt, would inevitably result in the prolongation of the controversy which badly needs the finality of decision which can be made only by the Supreme Court. In other words, the interests of all, so we think, will be better served with this controversy *on its way up rather than back from whence it comes.*" (emphasis supplied).

Thus the District Court passed the cause on to this Court stating that it would be better on the way up than on the way down. In so doing, it failed to give due consideration to the basic issues which are now presented here on the merits.

This Court has many times emphasized the duty of the District Courts and the Courts of Appeals to make appropriate disposition of causes before them. This duty stems from the appropriate relationship of the lower courts to this Court and relates to the proper exercise of the functions and duties conferred on them in the disposition of matters submitted for decision. As will be noted from the cases cited, *infra*, there have been occasions where District Courts have made hurried *pro forma* dispositions of cases in a desire to get them up to the appellate courts in the interest of expedition and finality. Time and again this Court has admonished against such practice.

Thus, in *National Labor Relations Board* v. *Pittsburgh S. S. Co.*, 337 U. S. 656 (1949), a cease-and-desist order issued by the Board was refused enforcement by the Court of Appeals on the ground of bias, without considering the impact of the Administrative Procedure and the Taft Hartley Acts. This Court, saying (p. 662) that "these questions should be considered in the first instance by the Court of Appeals", remanded the cause.

Similarly, in *United States* v. *Interstate Commerce Commission*, 337 U. S. 426 (1949) a District Court of three judges dismissed a suit brought by the United States to set aside an order of the Interstate Commerce Commission, denying an award of reparations to the Government as a shipper without reaching the merits, on the theory that the Government could not sue itself. "Since the District Court did not pass on the merits of the allegations of the complaint, * * *" the cause was "remanded * * * for that purpose" by this Court (p. 444).

Again, in *Federal Communications Commission* v. *WJR*, 337 U. S. 265 (1949) the Commission denied WJR's petition for reconsideration of an order granting to Tarboro an application for a permit to construct a radio station. The Court of Appeals reversed because of the Commission's failure to grant WJR an oral hearing, and "refused to consider whether the Commission was right in its legal conclusion" that WJR could not complain of the grant of the license to Tarboro. This Court held that WJR was not entitled to an oral hearing but was entitled to review by the Court of Appeals of the "merits of the question" (p. 285). "That question, being one of law, might now be decided here. But since the statute, if it affords respondent a right of appeal, provides that it shall be to the Court of Appeals, and since that court has not decided the basic issue on the merits * * * the cause should be remanded to the Court of Appeals for decision of that question * * *" (p. 285).

The principle of these cases has been stated by this Court (per Holmes, J.) to be that "it is not desirable" where "the District Court had jurisdiction and a duty to try the question" for this Court to "pass upon such matters until they have been dealt with below * * *" (*Oklahoma Natural Gas Co.* v. *Russell*, 261 U. S. 290, 293 (1922)).

See also:

Lutcher & Moore Lumber Co. v. *Knight*, 217 U. S. 257, 267 (1910);

William Cramp & Sons Co. v. *International Curtiss Marine Turbine Co.*, 228 U. S. 645, 647, 648-9 (1913);

Lamar v. *United States*, 241 U. S. 103, 110 (1916);

Brown v. *Fletcher*, 237 U. S. 583, 587 (1915);

Marconi Wireless Telegraph Co. v. *Simon*, 246 U. S. 46, 57 (1918);

Ex Parte Harley-Davidson Motor Co., 259 U. S. 414, 417-418 (1922);

McCardle v. *Indianapolis Water Co.*, 272 U. S. 400, 424-425 (1926) (dissent per Brandeis, J.).

Moreover, the judicial review provided by Congress "as an additional assurance that its policies be executed" (*United States* v. *Carolina Freight Carriers Corporation*, 315 U. S. 475, 489 (1942)), has received added emphasis in the Administrative Procedure Act. Under that Act Congress has enjoined on the reviewing court the duty to decide all relevant questions of law, interpret statutory and constitutional provisions, determine the scope of any agency action, and set aside such action or findings if in violation of the standards set by the statute (60 Stat. 243, 5 U. S. C. § 1009).

Effective enforcement of that policy can only be achieved, as indicated by the decisions adverted to above, by remanding this case to the District Court to review the Order of the Commission in pursuance of the duty enjoined upon it.

II. THE COMMISSION'S ORDER IS INVALID BECAUSE:

(a) THE COMMISSION'S FINDINGS OF SEPTEMBER 1, 1950, DID NOT JUSTIFY THE ORDER OF OCTOBER 10, 1950, ADOPTING THE CBS SYSTEM; ON THE CONTRARY, THE COMMISSION FAILED TO FIND THAT THE CBS SYSTEM WAS SATISFACTORY, AND ITS ORDER WAS ADMITTEDLY BASED IN AN IMPORTANT PART ON SPECULATION AND HOPE;

(b) THE COMMISSION'S ORDER WAS ARBITRARY AND VIOLATIVE OF ADMINISTRATIVE DUE PROCESS BECAUSE IT SOUGHT TO IMPOSE UPON THE MANUFACTURERS OF TELEVISION SETS, OVER WHOM THE COMMISSION HAD NO JURISDICTION, CONDITIONS WHICH, AS A PRACTICAL MATTER, COULD NOT BE COMPLIED WITH EVEN IF THIS HAD BEEN WITHIN THE COMMISSION'S AUTHORITY, AND THE COMMISSION INSISTED THAT THERE BE NO HEARING AS TO THE IMPOSITION OF THESE CONDITIONS;

(c) THE COMMISSION'S FINDINGS DO NOT JUSTIFY ADOPTION OF ANY COLOR STANDARDS AT THIS TIME IN VIEW OF THE FLUID AND RAPIDLY DEVELOPING STATE OF THE ART; AND

(d) IF IT WAS PROPER FOR THE COMMISSION TO ADOPT COLOR STANDARDS AT THIS TIME, THE COMMISSION FAILED TO CONSIDER WHETHER, OR TO FIND THAT, THE CBS AND RCA COLOR SYSTEMS COULD NOT SUCCESSFULLY CO-EXIST, AND ARBITRARILY EXCLUDED THE RCA COLOR SYSTEM.

(a)

In its Findings and First Report of September 1, 1950, the Commission did not finally adopt the CBS system. The Commission found only that the system was satisfactory "from point of view of texture, color fidelity and contrast" (R. 163). It immediately went on to find serious defects in the system: "the susceptibility to flicker . . . is greater than in the present monochrome system . . ."; and "the CBS system is subject to color fringing or color break-up under certain circumstances . . ." (R. 163). "The CBS system has less geometric resolution than the present monochrome system. . ." (R. 163). "The CBS system is, as a practical matter, limited to . . . direct view tubes of no greater size than 12½ inches . . ." (R. 164).

These findings manifestly would not have warranted an over-all finding approving the CBS system, and none such was made. In the Second Report of October 10, 1950, ordering the adoption of that system, the Commission for the first time made a flat declaration that adoption of the CBS system would be in the public interest (R. 420); but this Report was based upon no further evidence, none having been taken.

Not only was the Order thus unsupported by the findings, it was based in an important part on speculation and hope, as the Commission itself admitted. The Commission did not know whether the tri-color tube—pioneered and developed by RCA and others—could be used with the CBS system (R. 164-165). If it could, then the CBS equipment was obsolete before adoption, for the tri-color tube was not restricted in size and would eliminate the cumbersome and expensive color wheel (R. 164). During

the course of the hearings, which stretched from September 26, 1949, to May 26, 1950, constant and rapidly mounting improvements were made in the tri-color tube, so much so that in its First Report the Commission frankly stated it was confronted with "difficult courses"—whether to reopen the hearings in order to inform itself as to the latest developments in the RCA tri-color tube, or to adopt the CBS standards at once in the "confidence" that the electronics engineer would, by perfecting the tube (if it was not already perfected), extricate the Commission from the havoc it would create by adopting the CBS system. The Commission was frank to admit that the "advantage" of reopening the hearings "is that the Commission would not be compelled to *speculate as to an important basis for its decision*, but would have a definitive answer on . . . which to act . . ." (R. 165; italics ours). And the Commission could not deny that to adopt the CBS system on September 1 would be erroneous: "The disadvantage is that the Commission's determination on an important part of its decision would be based on *speculation and hope* rather than on demonstrations . . ." (R. 165; italics ours).

The Commission confessed that it was faced with the same difficult choices as to three other matters: "horizontal interlace," "persistence phosphors", and "the possibility of new color systems" (R. 165-166).

The Commission, nevertheless, concluded not to reopen the hearings. By its own admission, therefore, an "important part of its decision" was based upon pure "speculation and hope", rather than upon evidence. It is submitted that the rights of parties ought not to be thus determined, and that the speculative basis of the Commission's order is an additional and independent ground for setting it aside.

(b)

The Commission's unwillingness to order the adoption of the CBS system at the time of its First Report was quite natural in view of the inconclusive and speculative nature of the evidence. However, instead of postponing any order until the state of the art had developed sufficiently to enable action to be taken with prudence and confidence, the Commission embarked upon an unprecedented and arbitrary course. In its First Report it entered an order, the effect of which was to say to the manufacturers, who for reasons similar to those advanced by Emerson were vigorously against the adoption of the CBS system:

> We will impose that system upon you:
>
> (a) Unless a "sufficient number" of you (R. 167) assure us that you will hereafter manufacture "the great majority of television receivers" in accordance with "bracket standards" to be promulgated by us, in such a way as to enable the receivers to convert CBS color broadcasts into black and white (so that if at some later stage we should find it necessary to order the adoption of that system, the owners of the sets acquired in the meantime will be able to enjoy black and white broadcasts without having to buy expensive adapters); and
>
> (b) Unless we may adopt these "bracket standards" (which we are including now in a "Notice of Proposed Rule Making") as final, without a hearing (R. 167).

The Commission had no jurisdiction over the manufacturers. By holding over their heads the threat of an order to impose the CBS color system upon them, to their great injury, the Commission sought to exact from them a promise

to furnish their sets with a modified equipment geared to the proposed "bracket standards". This new equipment was as yet untried. The Commission apparently believed, however, that if it were adopted it would enable the new sets to convert CBS color to black and white without adapters, in case the CBS system were later effectuated by order of the Commission. The Commission was unwilling to enact the proposed "bracket standards" into rules unless assured that it could do so without a hearing.

Such was the alternative presented to the manufacturers as the price of avoiding an order imposing upon them the CBS system of broadcasting. They were given less than 30 days in which to make up their minds. The First Report, containing this extraordinary alternative, which if it had been accepted would have relieved the Commission from the embarrassing task of ordering the immediate adoption of the CBS system upon a record shot through with "speculation and hope", was put forth on September 1, 1950. The manufacturers were given only until September 29, 1950, to decide whether or not they would give the necessary assurances to the Commission (R. 167). As might have been foreseen, they concluded that it was wholly impracticable to give such assurances. Accordingly, on October 10, 1950, as previously described, the Commission entered its order adopting the CBS color system.

A reading of the Second Report embodying this order leaves no doubt that it was the inability of the manufacturers to comply with the bracket standards—the Commission's language was "unable or unwilling"—which prompted the final order. In the dissenting opinion of Commissioner Sterling one finds a fuller statement of the problems faced by the manufacturers. Commissioner Sterling documents

the surprise and confusion which followed the First Report; the time lost in attempts at clarification; the engineering problems faced by an industry willing and anxious to conform, but unable to meet an impossible time schedule; the serious problems of production, procurement and manpower created by the demands of national defense which harassed the industry; and the shortage of basic materials which hampered the industry. These matters led the Commissioner to conclude "that the Commission's time table presented to industry in its First Report to build in bracket standards was unreasonable" (R. 426), and that he should therefore "dissent from this premature action taken by the majority at this time" (R. 421). Commissioner Hennock's dissent, emphasizing the "progress made in the development of color television since the start of the proceeding" stated that, "it is of vital importance to the future of television that we make every effort to gain the time necessary for further experimentation leading to the perfection of a compatible color television system" (R. 430-431).

It is submitted that the Commission's procedure leading up to the October 10th order was arbitrary and violative of administrative due process: (1) In effect it delegated to a group of manufacturers the power to determine whether the CBS system would presently be mandated to the public, to the exclusion of any other, or whether further time should be devoted by the Commission to exploring the latest developments in the art with a view to the ultimate formulation of a decision based upon evidence and knowledge instead of "speculation and hope." (2) It was designed to exert pressure upon the manufacturers, without a hearing, and under extreme limitations of time, to agree to take action which the Commission could not require of them under the law.

Finally, it is submitted that the procedure adopted by the Commission—designed, if it had been successful, to afford the Commission, in its own language, "time to explore more fully the matters set forth above" (i.e., the latest developments in the art)—is one more piece of evidence that the Commission's Order of October 10th was based upon conjecture rather than upon facts.

(c)

An additional reason why this Court should set aside the Commission's order is that in view of the fluidity and rapidity of development of the art of color broadcasting, the Commission acted arbitrarily and contrary to the public interest in freezing that development by the premature adoption of the CBS system.

Until the issuance of the order here challenged, the Commission, acutely aware of the dynamic nature of the electronics field, had acted with the utmost caution. When black and white standards were pressed on its attention, it prudently withheld action until assured by scientists and the industry that action was proper. And it explained (in 1941) the proper relation of the administrator to the scientist in these words (R. 563):

> "In its regulation of television in the public interest, the Commission, in the light of the evidence before it, has set as its goal unfettered technical development and engineering advance. In dealing with the problem of setting television transmission standards the Commission has, therefore, sought to avoid action which would freeze the state of the art at an unsatisfactory level of performance.
>
> * * * * *

> "The art of television has been under development for more than a decade. During this time the Commission has issued a number of licenses for experimental purposes looking toward the development of the science to the point where the Commission could be reasonably assured of television's readiness for a competitive public service upon a sound technical basis and upon a single uniform system."

When we lay these words of discreet self-limitation beside the Commission's own admission of the state of the color art in 1950, we know at once the fatal error of the Commission's order: it represented action when every dictate of common sense cried for cautious delay. As the Commission admitted:

> "The state of the television art is such that new ideas and new inventions are matters of weekly, even daily occurrence; . . . (R. 411).
>
> * * * * *
>
> "The Commission is aware that the institution of these proceedings stimulated great activity in the color field and that since fundamental research cannot be performed on schedule, it is possible that much of the fruit of this research is only now beginning to emerge . . ." (R. 166).

And Commissioner Hennock stated that:

> "The improvements which took place during the course of the hearings, a relatively short time when compared to the previous course of television development, was impressive . . ." (R. 190)

The Commission further stated in its First Report (R.165-166):

"147. Three other matters present the Commission with the same difficult choice between the two courses of action referred to above [i.e., to reopen the hearings or to adopt the CBS system]. Two developments were demonstrated in this hearing which hold real promise for increasing definition both in color and black and white pictures. One is horizontal interlace and the second is the efficacy of long persistence phosphors in reducing flicker, thus providing the means for decreasing the field rate and increasing the number of lines in the picture. Both of these techniques require further testing and, if successful, may make desirable additional changes in the field and line repetition rate.

"148. The third matter we refer to is the possibility of new color systems and improvements in existing color systems which have been informally called to our attention since the hearings closed. Of course, these are not matters of record and cannot be relied on in reaching a decision unless the record is reopened. . . ."

One would have supposed that in the light of these facts the Commission could rationally have reached but one conclusion: to extend the hearings and consider the new developments. But the Commission, determined upon an opposite course, went on to say:

"On the other hand, the Commission cannot overlook the obvious fact that one of the easiest methods of defeating an incompatible system is to keep on devising new compatible systems in the hope that each new one will mean a lengthy hearing so that eventually the mere passage of time overpowers the incompatible system by the sheer weight of receivers in the hands of the public" (R. 166).

In this passage the Commission implies a helplessness which the nature of the Order entered by it on October 10th shows to have been unreal. The Commission was perfectly capable of cutting short at any time the process of investigating new compatible systems, just as it cut short that process on October 10. The Commission suggested in the quoted passage, however, that if it had opened up the hearings to explore the latest developments it would have been bound to go on and on indefinitely exploring new developments, until in time the incompatible system invented by CBS would become a dead letter and would never reap any fruits. Obviously, however the Commission's freedom of action would in no way have been circumscribed if it had reopened the hearings to consider the latest developments in the art. It might well have concluded after such a reopening that the developments indeed were such that in the public interest it would be altogether premature and injurious to direct the adoption of the CBS system. Or the Commission might have concluded that the developments were not sufficiently promising to warrant further delay and it could then have made a finding—not based on "speculation and hope"—that the CBS system was, in the light of all the available facts, a satisfactory one for the country. The Commission, in short, would still have remained the master of its own house.

The very fact that the Commission should have gone out of its way to pose this unreal alternative to immediate approval of the CBS system obscures, rather than illuminates, the Commission's real reason for haste. Yet, viewed from another angle, the quoted passage suggests a motivation which, if it were the true one, must surely be regarded as improper, namely, that the originator of an incompatible

system ought not to be prevented from putting it upon the market by the efforts of rival compatible systems to cause Commission investigations of their claims. But why this solicitude for an incompatible system? The Commission's own Report concedes that incompatibility is a disadvantage to the myriad owners of existing sets who must buy expensive adapters and converters in order to enjoy incompatible broadcasts. The Commission seemed to argue that there was a presumption in favor of the incompatible system arising merely out of its primacy in development. In this case, however, at the very time that the Commission decided to bestow its approval upon the incompatible CBS system, it knew that rapid developments in the art of color broadcasting through compatible systems had occurred during the course of the hearings, and yet the Commission refused to take the relatively little additional time which would have been necessary to consider these developments before arriving at a final conclusion. It need not have taken this action on its own motion, for on October 4, 1950 RCA petitioned the Commission to review the improvements made in the RCA system, stating that by "June 30 we will show that the laboratory apparatus which RCA has heretofore demonstrated has been brought to fruition in a commercial, fully-compatible, all-electronic, high-definition system of color television available for immediate adoption of final standards" (R. 409).

On October 10, 1950 the Commission denied the RCA petition out of hand with a brusque reference to "administrative finality"* and, on the next day, issued its Second Report and Order adopting the CBS standards (R. 413-434).

---

*Exhibit F annexed to Complaint; R. 411.

It is submitted that this action was arbitrary, and that it betrayed a bias toward the incompatible CBS system unwarranted by anything in the record.

(d)

In addition to adopting CBS color, the Commission's order excluded RCA color.* But there were no findings supporting and justifying such an exclusion. There were no findings that only a single system of color must be adopted, or that the RCA system would interfere with the CBS system, or with the existing monochrome system. Indeed, and to the contrary, there was a finding that RCA color could be received as satisfactory black and white on existing receivers (R. 160). Since compatibility is a highly coveted characteristic of color transmission, it would appear to be very much in the public interest to allow RCA color; certainly the exclusion of RCA color should not stand unless supported by a finding that RCA color was not in the public interest.

These findings do not exist. Their absence renders invalid the order which excludes RCA color.

The Commission, when it excluded the RCA system, may have acted under a compulsion induced by an erroneous view of the law. It may have assumed that the Communications Act of 1934 required that only one system of color be allowed to operate. We have used the word "may" advisedly, for we do not know what was the Commission's

*The Commission, by adopting technical standards appropriate only to CBS color, excluded RCA color. Judge Major asked the Commission's counsel: "If they don't like the color broadcast of CBS can they turn to some other color broadcast?" Counsel admitted: "They cannot receive RCA color broadcasts, and the reason they cannot receive RCA color broadcasts is that they have not been authorized under Commission standards . . .".

view. We are entitled to know. There should have been findings on this point. (*Yonkers* v. *United States*, 320 U. S. 685 (1944).)

If, as a matter of law, several competing systems of color could be allowed to broadcast under the Communications Act of 1934, and if the Commission erroneously decided, as a matter of law, that only one system could be permitted, then its decision excluding RCA would be wrong if based on that incorrect view of the applicable law. Moreover, it may be that if the Commission understood that under the law, two, or more, non-conflicting color systems could operate simultaneously, it would not have excluded RCA from the air. Since the Commission has failed to make findings on this point, it is impossible to know whether its exclusion is based on a misconception of the law, or the facts, or both.

This Court has pointedly refused to sanction administrative orders which could have been based on improper views of the law buried in vague findings. It has said:

> ". . . if the action is based upon a determination of law as to which the reviewing authority of the Courts does come into play, an order may not stand if the agency has misconceived the law." (*Securities and Exchange Commission* v. *Chenery Corp.*, 318 U. S. 80, 94 (1943).)
>
> ". . . If, as seems likely here, an erroneous statutory construction lies hidden in vague findings, then statutory rights will be whittled away." (*United States* v. *Carolina Freight Carriers Corporation*, 315 U. S. 475, 489 (1942).)

And there is another matter in which the Commission's view of the law may have compelled an erroneous conclusion. We refer to section 303 (e) of the Communications

Act (48 Stat. 1082; 47 U. S. C. § 303(e)), which is the vital source of Commission power. This section authorizes the Commission "to regulate the kind of apparatus to be used with respect to its external effects and the purity and sharpness of the emissions . . ." It is conceivable that the Commission felt that under this statute it was compelled to choose only one system, and so it fixed standards tailored to fit just that system. But there is nothing in the words of 303 (e), or in the statutory history, or in policy, which requires that regulation by the Commission should be limited to the choice of only one system. To the contrary, there are important considerations which impel the view that 303 (e) permits a range of standards, or the fixing of minimal criteria in standards.

It is conceivable that there may be several acceptable systems of broadcasting color, each of which may be superior in separate ways, and all of which may produce good color broadcasts. There is no sound reason why all of such systems may not be allowed to broadcast their color, so long as they fall within a range of acceptable standards. Such a view of the law would require the Commission to fix such a range and allow the operation of all systems which come within its scope. This would permit competition, which is in the public interest. Here, it would also allow RCA to broadcast its compatible system, which is equally in the public interest.

Presumably, when the Commission adopted its October 10, 1950, Order, it believed that 303 (e) required it to choose only one system. We think this to be wrong, because the statute clearly permits more than one system, so long as the external effects and the purity and sharpness of the emissions of each system falls within the range of acceptable broadcast contemplated by 303 (e).

The only other ground on which it can be supposed that the Commission saw fit to frame its standards in such a way as to exclude the RCA system, while permitting the CBS system; is that, as the Commission found, the RCA color broadcasts had not yet been developed to as satisfactory a point as the CBS system, deficient as the latter was. We need not here advert to the point already made that the Commission arbitrarily refused to consider the state of the development of the RCA system which had been achieved during and after the hearings, so that there was no way of telling whether, at the time the Commission's Order was finally entered, the RCA color system was not the equal of the CBS system. Assuming for the sake of argument that even as of that time the RCA color broadcasts had not yet reached as satisfactory a point of development as the CBS color broadcasts, we nevertheless submit that since, as the Commission found, the RCA color broadcasts could satisfactorily be received in black and white by any owner of a set who might not choose to receive them in color, the possible deficiency in the quality of the RCA color broadcasts should not have operated to exclude the system from the air.

If the art of color broadcasting had, at the time of the Commission's Order, reached a mature point of development, the Commission might perhaps have been warranted in excluding from the air the inferior of the two systems. But the Commission's own findings demonstrated that the art was in its infancy and developing at a pace which was bewildering even to the Commission. Given this fundamental fact, to which the Commission paid so little heed, what rational ground existed for excluding the RCA system from competitive development along with the CBS system?

Suppose that, for a short time, the RCA color broadcasts proved in fact to be inferior to the CBS. As previously stated, all set owners could at any time receive in black and white the RCA color signals without the addition of new equipment; and if the superiority of the CBS system were such as to win the favor of the public, the RCA system would have to be either abandoned or improved to the point where it could successfully compete with the CBS system. This process of competition has, of course, been the life-blood of our economy and the great begetter of inventions. In the fluid state of the color broadcasting art, how can it be doubted that if the RCA and the CBS systems were allowed to compete with one another, improvements in each would not constantly be made, thus giving the public greater and greater quality of reception until, when the art reached full maturity, one system or the other would finally gain the ascendancy?

As stated at the outset, Emerson has no interest in one system or another. It is concerned only with the establishment of a condition of affairs in which the maximum possible advance in the art of color broadcasting may be achieved, to the end that Emerson may constantly improve its own products and the service which it renders to the public. It is the great tragedy of the Commission's Order that at the very moment when color broadcasting was about to burst into a long and multiform blooming the Commission should have seen fit to stunt its growth by arbitrarily cutting off the freedom of one of its branches to contribute its blossoms.

The injury caused by the Commission's precipitate and restrictive action was not merely to RCA, and not merely to the set manufacturers, but to the public, whose interest,

lies, at this stage of art, in its fullest and freest development.

CONCLUSION

The Commission's order should be annulled. In the alternative, the matter should be remanded to the District Court for proper review, or to the Commission to take such action and make such findings as will permit proper judicial review.

Respectfully submitted,

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IN THE

Supreme Court of the United States

OCTOBER TERM, 1950.

No. 565

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., RCA VICTOR DISTRIBUTING CORPORATION, ET AL.,

Appellants,

vs.

THE UNITED STATES OF AMERICA, FEDERAL COMMUNICATIONS COMMISSION, AND COLUMBIA BROADCASTING SYSTEM, INC.,

Appellees.

APPEAL FROM THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF ILLINOIS.

BRIEF FOR THE APPELLANT, INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS, AFL.

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INDEX.

Subject Index.

PAGE

Brief for Local 1031, International Brotherhood of Electrical Workers, AFL 1

Opinions below 1

Jurisdiction 2

Questions presented 2

Statement 2

Summary of Argument 4

Argument:

I. The challenged order of the Federal Communications Commission is in excess of the Agency's statutory authority..... 5

II. The Commission's reports and orders were at substantial variance with its Notice of Proposed Rule-Making..... 18

Conclusion 21

Appendix A—Text of Statutes involved 23

Appendix B—

Table 1—Television Set Production 1950 (By model classification and tube sizes)..... 27

Table 2—Television Set Production 1950-1951 (By tube sizes) 28

TABLE OF CASES CITED:

National Broadcasting Co. v. United States, 319 U. S. 190 ..... 5, 6, 7, 13

Scripps Howard Radio, Inc. v. Federal Communications Commission, 316 U. S. 4 5

STATUTES CITED.

Administrative Procedure Act:
Section 1004 (a) 18
Section 1004 (e) 19

Communications Act of 1934, Title 47, U. S. C.
Section 402 (a) 5, 8, 18

Defense Production Act of 1950, Public Law 774, 81st Cong. 2nd Sess. 17

National Labor Relations Act, Title 29, U. S. C.
Section 151, et seq. 3

United States Code, Title 28 (Judicial Code):
Section 1253 2
Section 2101 (b) 2
Section 2321 18
Section 2323 ..... 5, 8, 18

PUBLICATIONS.

Chicago Daily News, March 14, 1951, p. 22 14

"The Present Status of Color Television" Report of the Advisory Committee on Color Television to the Committee on Interstate and Foreign Commerce, United States Senate, July 14, 1950. 81st Cong. 2nd Sess., Document No. 197 12

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OPINIONS BELOW

The majority and dissenting opinions of the United States District Court for the Northern District of Illinois are reported at ..... F. S. .....

JURISDICTION.

The Jurisdiction of the Supreme Court of the United States to review the decision below by direct appeal is conferred by Title 28, United States Code, Sections 1253 and 2101 (b). On March 5, 1951, probable jurisdiction was noted by this Court and the case assigned for argument on March 26, 1951.

QUESTIONS PRESENTED.

This appellant adopts as its own the statements of questions presented which are set forth in the brief filed herein by the Radio Corporation of America, National Broadcasting Company, Inc. and RCA Victor Distributing Corporation, appellants and in the brief filed herein by Emerson Radio and Phonograph Corporation, appellant.

STATEMENT.

The brief of Radio Corporation of America and its affiliates contains a statement of the case which accurately recites the nature and chronology of the proceedings before the Federal Communications Commission and before the Court below.

The appellant, Local 1031, International Brotherhood of Electrical Workers, AFL, is a voluntary, unincorporated labor organization. Its headquarters are in Chicago, Illinois. The Local Union has a good-standing membership in excess of 21,000. Not less than 18,000 of its members are employed in and around Chicago and Bloomington, Illinois by manufacturers of television receivers or receiver parts and equipment. Virtually all members of the Union own and operate television receivers in their homes.

Under the provisions of the National Labor Relations Act, 29 U. S. C., § 151, *et seq.*, and pursuant to representation elections conducted by the National Labor Relations Board, this appellant acts as statutory collective bargaining representative for the employees above described and in their behalf has negotiated and administers a host of collective labor agreements with their employers.

The average aggregate annual earnings of the members of the Local employed in manufacturing television parts, equipment, and receivers exceed the sum of fifty million dollars. Any disruption of the continuity of their jobs unlawfully or unwarrantedly induced by the Federal Communications Commission order complained of would cause permanent and irreparable damage to the members of the Union thus employed.

The Union asserts the rights of its members in this proceeding not only as manufacturing employees, but as owners and users of television receiver equipment. (R. 548-55.)

Local 1031 took no part in the proceedings of the Federal Communications Commission which are under attack. A full explanation for its non-participation in such proceedings appears clearly in the argument herein. The appellant's direct and substantial interest in the case at bar was recognized by the Court below. Over the objections of the defendants, the Court below granted the Union leave to intervene in the proceedings, to file its complaint and its affidavits in support thereof. (R. 791, 796, 864.)

SUMMARY OF ARGUMENT.

The Federal Communications Commission "Color TV" order flouts the public interest, fosters public inconvenience, and is based upon no public necessity. Such order was, therefore, in excess of the Commission's statutory authority. The Court below recognized these defects in the Commission's order, but erroneously refused to consider the public consequences of the order, on the ground that the overwhelming public distaste for the mandated method of color television broadcasting was demonstrated outside the record made by the Commission. In a case where an agency order directly invades millions of American homes, intrudes upon family budgets, impairs established values of expensive home equipment, and otherwise disrupts the reasonable and normal expectations of the public, ordinary considerations for the "administrative record" should not be sterilely and mechanically applied. Under such circumstances the Court has the statutory right, if not the duty, to evaluate the natural and probable public impact of the impending agency action, even though the agency has blindly refused to consider such consequences. Upon a proper showing, as was here made, the Court should annul the order or at least suspend it pending hearing of such issues by the agency.

In adopting a second standard of black and white broadcasting and in other respects the order complained of was at substantial variance with the Commission's Notice of Proposed Rule-Making of July 11, 1949. It therefore deprived this appellant and others similarly situated of the right and opportunity to be heard in the rule-making procedure and to present vital information and arguments concerning the public interests which would be violated by "incompatible" broadcasting of color and black-and-white TV signals.

ARGUMENT.

I.

The Challenged Order of the Federal Communications Commission Is in Excess of the Agency's Statutory Authority.

Attitudes and approaches of the litigant who challenges action of the Federal Communications Commission have been delineated by this Court. This appellant may be moved to act in these proceedings as the protector of the economic interests of its membership, as employees and set owners, but it has standing in this Court only as a representative of the public interest. *Scripps Howard Radio, Inc.* v. *Federal Communications Commission*, 316 U. S. 4, 14; 62 S. Ct. 875, 882. The Commission was not left "at large" in determining what constitutes public interest, convenience or necessity. *National Broadcasting Company* v. *United States*, 319 U. S. 190, 216; 63 S. Ct. 997, 1009. Opportunity for asserting public interest was expanded by the liberal provisions for the intervention of municipal corporations, associations and other parties interested in a pending controversy, which are incorporated in the statutory scheme for judicial review of FCC action. 47 U. S. C. 402 (a); 28 U. S. C. 2323. If the public interest is the standard for parties who appear before the Commission or the Courts to advocate or challenge proposed Commission action, then a yet higher degree of impartiality and poise must control the Federal Communications Commission when it seeks to use its comprehensive regulatory powers, purportedly to "secure the maximum benefits of radio [and television] to all the people of the United

States." *National Broadcasting Company* v. *United States*, 319 U. S. 190, 217; 63 S. Ct. 997, 1010.

The tragedy in the record now before this Court lies in the failure of the Commission and of the majority of the Court below to evaluate the color television controversy in terms of the ultimate public interest and their unwillingness to view it as something other than a test of strength between the RCA group and the CBS group, the two giants of the broadcasting industry. Every editorial caution of their draftsmen does not prevent the Commission's two reports in support of their orders (R. 95-288, 413-31) from reading like bitter polemics against the RCA-NBC group and hasty rationalizations in favor of the CBS combine. The majority of the Court below fell into this same error of approach when it declared, "The contest is mainly between two great broadcasting systems for a position of advantage in this rapidly developing field of television." ..... F. S. ....., at ..... (R. 878.)

It is precisely because the issues of the case at bar transcend the private rights of any of the parties to this controversy, including the sensitive egos of the majority of the members of the FCC, that this labor organization intervened in the proceedings below and participates in this appeal.

The economic jeopardy, to which its members would be subjected by necessary changes in manufacturing methods, retooling and redesigning of television receivers to receive the CBS signals in black-and-white or color, demonstrates the interest which this appellant was required to show to intervene in the proceedings below. But its apprehensions concerning the continuity of employment and the maintenance of earnings of its members would alone, concededly, be a narrow, if not fatuous, ground for asking this Court to overturn the Commission's order. If a period of

conversion unemployment for the members of the Union were the sole price of enabling the radio and television industry as a whole to achieve an orderly transition to efficient and satisfactory color television broadcasting and reception, the Union's voice would not be heard in litigious protest.

The members of this Union come to the bar of this Court with the insight of workers who know intimately all phases of the television receiver manufacturing industry. They come with the discernment of receiver owners and television viewers of long experience and understanding. In this capacity and in this right they assert that the Federal Communications Commission color order would invoke a public disaster of the first magnitude. It is in this spirit that they declare that the order complained of would promote a needless and unwarranted experiment in television broadcasting and manufacture which is clearly destined to early failure at great public cost.

This court has said "Generalities unrelated to the living problems of radio communication of course cannot justify exercises of power by the Commission. Equally so, generalities empty of all concrete considerations of the actual bearing of regulations promulgated by the Commission to the subject matter entrusted to it, cannot strike down exercise of power by the Commission." *National Broadcasting Company* v. *United States*, 319 U. S., 190, 219; 63 S. Ct. 997, 1011.

We submit that the same regard for "living problems" and "concrete considerations" should be commanded of the Federal Communications Commission in the case at bar.

The cliches of administrative law should not have blocked consideration by the District Court of demonstrable physical and economic facts which expose the fallacious conclu-

sions of the Commission. There exists cogent statutory authority for consideration of such facts even though they were not presented when the administrative record was being made, or had not yet occurred when the record was closed.

The statute regulating proceedings to enforce, suspend, enjoin, annul, or set aside orders of the Federal Communications Commission, allows intervention at any time after the commencement of such District Court proceedings, by "communities, associations, corporations, firms and individuals interested in the controversy or question before the Commission." Title 47, U. S. C. § 402(a); Title 28, U. S. C. § 2323. Participation in the proceedings before the Commission is not a *sine qua non* for intervention in the judicial review action. This legislative scheme for court review of Commission action permits latitude of presentation and argument on the part of an intervener who is first identified with the proceedings after procedures in the District Court have been invoked pursuant to the statute. Accordingly, we submit that the majority of the Court below erred in refusing to consider at all the evidence and contentions offered by this appellant in the trial proceedings because they were "predicated upon matters outside the record made before the Commission." ..... F. S. ....., at ...... (R. 872.) Any other statutory construction would render meaningless and futile, legislatively-sanctioned intervention by "communities, associations, corporations, firms or individuals" in the court proceedings to review Commission action. What would intervention avail them if such parties were held strictly to the confines of an administrative record completed without their participation?

This construction of the statute applies *a fortiori* to the case of the intervener who is first made aware of the dangers of impending agency action only after the agency

hearings have been closed and the order published. See Point II below discussed.

We do not wish this portion of our argument to be misconstrued. We do not assert that the District Court should have tried the matter *de novo* or should otherwise have substituted its judgment for that of FCC. But we do declare that the District Court would have been correct under the statute in yielding to its announced inclination "to vacate the order and send the proceedings back to the Commission for further consideration in view of recent developments in the color television field as well as the rapidly changing economic situation." ..... F. S. ....., at ..... (R. 875.)

Conceding, *arguendo*, that the Commission's record accurately reflects facts as they existed at the time the hearings were closed on May 26, 1950, economic events since the close of the hearings nullify the conclusions now sought to be sustained by the Commission.

There are now estimated to be about twelve million television receivers in the hands of the American public. The District Court accepted as accurate the estimate that nine million receivers were in use just prior to the hearing below. ..... F. S. ....., at ..... (R. 794-5.) Reliable manufacturing sources (See Appendix B, hereof) show that about three million additional receivers were manufactured in the four month period, November 1, 1950 to February 28, 1951.

A description of the nature, character and design of this receiving equipment now being utilized and enjoyed by the people of this nation will demonstrate the fallacies inherent in the FCC order here challenged.

Commercial standards for transmission and reception of monochrome (black and white) television programs were established by the FCC in 1941. Because of war, home tele-

vision receiver production in quantity did not commence until 1946.

Public acceptance of television was by no means rapid. These are the best estimates of the rate of receiver acquisition by the American public:

January 1, 1947	15,000 sets in use
January 1, 1948	200,000 sets in use
January 1, 1949	1,000,000 sets in use
January 1, 1950	4,000,000 sets in use
March 1, 1951	12,000,000 sets in use

(R. 3-4, 608; Appendix B hereof.)

For practical purposes all receivers in the homes of the nation are direct-view receivers.* In such receivers the broadcast picture is viewed on the face of the cathode-ray tube which is built into the set.

Early direct-view receivers were made with viewing tubes of seven inches or smaller. A seven inch tube yielded a picture of approximately 26 square inches. The small pictures available satisfied only the public desire for the novelty of seeing a moving picture in the home. It was necessary to sit so close to the tiny viewing tubes to enjoy a program that the projected lines making up the picture were distracting and annoying. Complaints of eyestrain, particularly among children, were common.

An experiment was tried in magnification of these small pictures by placement of a lens in front of the viewing tube to increase apparent image size. The experiment failed. The Commission has found, "Magnifying lenses have not

* Projection receivers in which the images received by the set are projected through a lens system onto a screen have found little or no public acceptance. The machinery is complicated and cumbersome. For viewing the room must be darkened. Image quality is generally unsatisfactory for home use because of severely restricted viewing angles. Projection receivers have some possibilities in public auditorium or theatrical use. Less than two thousand projection receivers were built in 1950 out of a total receiver production of seven and one-half million. (See Appendix B hereof.)

been popular in black-and-white receivers since they severely restrict the viewing angle and are susceptible to annoying specular reflections from lights in the room." (R. 150.)

Mass television acceptance, it soon became clear to the industry, could be successfully achieved only by giving the public larger pictures for convenient group viewing—in attractive, compact receivers. Seven inch set production yielded to ten inch sets which gave pictures of approximately 61 square inches. Ten inch sets gave way to twelve and one-half inch sets producing pictures of about 97 square inches. And still the pictures were too small in the opinion of potential home users.

The most dramatic turn was made in the year of 1950, while the FCC hearings were being conducted. The television manufacturing industry developed an attractive line of 16 inch and larger tube receivers, in pleasing design at reasonable prices. 16 inch tubes produce pictures of about 145 to 165 square inches and 19 inch tubes yield a picture of approximately 203 to 238 square inches. Tuning and control mechanisms were simplified. Group viewing of television programs was no longer a dream. It was a fact. The householders of the nation responded promptly. From January 1, 1950 to March 1, 1951 nearly nine million television receivers were manufactured and sold for home use. Six million of these sets were of tube size 16 inches or larger.

In January of 1951 more than 95% of the sets being manufactured were of 16 inch or larger tube size. Television has come of age. (Affidavit of Richard L. Hirsch, R. 777-789; Appendix B hereof.)

This is the miracle which FCC now seeks to undo. It is like trying to unscramble an egg and restore it to the shell. For in the framework of these economic realities

what is the real meaning and effect of the Commission's order here challenged?

The Commission virtually admits that sets with viewing tubes larger than 12½ inches cannot be successfully converted to receive the CBS signals in color.* While in its first report (R. 148-50), the Commission spoke hopefully of a reduction of the picture in a 16-inch or larger tube to 12½ inches, there is nothing in the record showing the existence or invention of any device whereby the set owner himself could effectuate such reduction in picture size automatically when CBS color signals were being broadcast and return the tube to full size for standard broadcasts.

The Commission also found that since the rotating disc or Columbia wheel must be placed in front of the viewing tube, "some existing receivers with doors or recessed tubes would, in practice, be difficult** to convert." (R. 148.) In 1950 nearly 300,000 receivers with tubes smaller than 16 inches were manufactured in models combining radio or phonograph or both. All of these sets have doors. How many receivers have recessed tubes cannot be estimated. But admittedly nearly 300,000 combination instruments with tubes less than 16 inches which were manufactured in 1950 cannot be converted for CBS color. (See Appendix B hereof.)

In its final report the Commission apparently abandoned the notion that existing direct-view receivers with tubes larger than 12½ inches could be converted for receipt of

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* With no equivocation the Condon Committee found that only "existing receivers with picture tubes of 12½ inches and smaller diameter can be converted to color reception, but at an appreciable cost."—"THE PRESENT STATUS OF COLOR TELEVISION."—Report of the Advisory Committee on Color Television to the Committee on Interstate and Foreign Commerce, United States Senate, July 14, 1950, 81st Cong., 2nd Sess., Document No. 197, p. 30.

** Agency euphemism for "impossible."

CBS color signals or that manufacture of new color receivers in sizes larger than 12½ inches was feasible. It advocated competition between 12½-inch or smaller direct-view receivers which could receive CBS color, as against 16-inch or larger direct-view receivers limited to black-and-white pictures. (R. 418.) In this context it is therefore clear that for the majority of American set owners—those possessing direct-view receivers of 16 inches* or larger and those owning TV-radio or TV-radio-phonograph combination sets with tubes smaller than 16 inches—color would be unobtainable unless they discard their receivers and purchase smaller sets.

The effect of the FCC order, then, is to force upon the majority of American TV set owners, the choice of adapting their sets to receipt of the CBS signal in black-and-white alone, or of foregoing available television information or entertainment for want of such adaptation. This would be the inevitable result of the Commission's adoption of CBS standards, although "the facilities of radio are limited * * * precious [and] cannot be left to wasteful use without detriment to the public." *National Broadcasting Co.* v. *United States*, 319 U. S. 190, 216, 63 S. Ct. 997, 1009.

The Commission heard evidence from independent manufacturers that aside from installation costs, external adapters with automatic switching from 525-line standard monochrome to 405-line CBS monochrome, could be made at a cost ranging from $37.00 to $65.00. (R. 147-8.) These figures which were among the lowest submitted in the testimony taken by the FCC, are unquestionably obsolete. Since May 26, 1950, when the FCC hearings closed, this country has experienced great rises in the cost of labor and materials.

The Commission also found that, based upon evidence

* We have no separate figures for 14 inch sets which are not convertible to color by FCC admission.

offered by independent manufacturers called as CBS witnesses, the retail price of adapting and converting an existing 7-inch tube receiver to CBS color would range from $95.00 to $130.00, the adaptation and conversion of a 10-inch set could be effectuated for from $110.00 to $150.00, and the adaptation and conversion of a 12½-inch set could be achieved for $125.00 to $170.00. (R. 148-9.) These figures apparently do not cover installation costs, and certainly do not take into account the inflation which now besets the nation.

Yet with its estimates standing alone without consideration of these other factors, the Commission has outlined a burdensome undertaking for that section of the television-viewing public which still owns smaller tube receivers.

At the time of the proceedings in the District Court, 7-inch receivers, no longer in production, were worth about $25.00. (R. 783.) As this brief was being written, new 10-inch receivers were being offered for sale in Chicago for $69.50. New 12½-inch sets were being sold for $139.95. (Chicago Daily News, March 14, 1951, p. 22.) The FCC tells those members of the public who own antiquated receivers in the smaller sizes that they may secure an additional service in the form of color if they will pay out in cash, to adapt and convert such receivers, from one and one-half to five times their existing value. To the majority of set owners, those who own larger receivers or smaller tube receivers combined with radio, phonograph or both, the Commission in effect says "You may not have the benefit of a color broadcast at all. Nor may you receive color broadcasts as black-and-white pictures unless you are willing to adapt your set by spending from $37.00 to $65.00, plus installation charges. This expenditure will give you access only to all services which were available to you in black-and-white before our order became effective. And you may receive CBS signals dur-

ing color broadcast periods, only as degraded, inferior black-and-white pictures."

There are more obvious flaws in the FCC approach to adaptation and conversion of existing sets. In all public demonstrations of the CBS system (see, for example, Time Magazine, October 23, 1950, p. 66) there was exhibited a CBS converter mounted on the corner of a television receiver. It was not demonstrated at the hearings that it would be possible to accomplish mass production of such converters. Common sense affirms the contrary. If the converter is to be mounted on the television receiver, consideration must be given to the wide variety of receiver designs. The unrefuted affidavit of J. O. Reinecke, industrial designer, submitted in the District Court, clearly sets forth the problem. Mr. Reinecke asserted:

> "I can state categorically that a standardization of adaptation and conversion systems on existing television receivers is impossible, not only because of the frequent changes in the physical cabinet design which have been made from time to time by the various manufacturers, but also because of the wide variety of shapes, dimensions, tube positions, knob positions, accessory positions, and utility space positions of the various television receivers.
>
> "The most difficult task of the designer attempting to create a mass-produced adaptation and color conversion system, is the placement of the color wheel in relationship to the receiving tube. Since this wheel must, according to all projections, be not less than twice the size of the tube, the designer is faced with the problem of relating the wheel or disc diameter to all of the external features of the receiver. Thus, on some receivers there are tuning knobs which would either be in the path of the color converter disc or which would be concealed by the disc or its housing. Many receivers have doors which could not be opened or closed across the space which must be allocated to the wheel. Other receivers have space for phonograph

or radio mechanism or album storage, which necessarily would conflict with wheel coverage.

"There has been no standardization of tube location in existing television receivers. Some are at the top of the cabinet. Some are centered on the cabinet. Some are recessed into the cabinet. Others project from the cabinet.

"Some cabinets have square corners. Others have rounded corners. In combination sets, the TV viewing tube may be on the left side of the cabinet, or it may be on the right side of the cabinet. The tube may be placed relatively high or relatively low with reference to the top of the cabinet." (R. 774.)

Are these practical observations to be rejected because they are "outside the record made before the Commission"? They certainly demonstrate that the findings of the FCC regarding the levels of costs for adapting and converting existing design receivers to receipt of the CBS signal are based entirely upon fantasy, not facts. Mr. Reinecke's statement also offers some common sense remarks on the problems of designing color converters, both for existing receivers and in new model receivers so that they will blend into the lines and shapes of normal household furniture. These comments further document the FCC disregard of the facts of life.

The lucid plea against the FCC order of a typical retailer of television receivers is contained in the affidavit of Richard L. Hirsch filed in the Court below. (R. 777-89.) This furnishes a full recital of the burdensome problems thrust upon the retailers of the nation who would have the responsibility of foisting upon the buying public the adapters, converters and new model receivers for the handling of CBS color broadcasts.

But the greatest reality of all is "outside the record made before the Commission". After the hearings were concluded in May, 1950, war broke out in Korea. The

nation was alerted. On September 1st Congress passed the Defense Production Act of 1950, Public Law 774, 81st Congress, Ch. 932, 2nd Sess., H. R. 9176; Approved Sept. 8, 1950. Administrative agencies were set up to mobilize material and manpower for the national defense. Allocations of vital materials to all non-essential manufacturing industries, including TV manufacture, were drastically restricted. Materials conservation became imperative. Yet in the face of all this the FCC still persists in struggling to sanctify its improper order. It is ironic that while emergency action is demanded by every other branch of the Federal government to conscript and conserve material and manpower in aid of the defense effort, the Commission still fights to uphold an order which will inevitably create a degree of public pressure for additional metals, for additional wiring, and for additional labor, merely to enable television receiver owners to maintain the access to all of the black-and-white broadcast service they are now receiving; and perhaps, in fewer instances, to receive the benefit of the CBS color broadcasts.

The interests of the nation at large in radio and television communications will be best served by the early thwarting of this ill-conceived FCC-CBS experiment, the return of the color television problem to the arena of laboratory improvement and trial broadcasting, and the effectuation of a truly compatible color system which will not disturb the full and efficient use of present receivers.

II.

The Commission's Reports and Orders Were at Substantial Variance With Its Notice of Proposed Rule-Making.

In the proceedings below, the defendants urged the Court to ignore any evidence, observation or evaluation made or offered by this appellant, because such matters were not submitted to the Commission during the course of its hearings, and hence were outside the administrative record. As we pointed out above, the statute permitting intervention by "communities, associations, corporations, firms and individuals interested in the controversy or question before the Commission * * * at any time after the commencement [of an action in the District Court] to enforce, suspend, enjoin, annul, or set aside, in whole or in part, any order of the [Federal Communications] Commission * * *" Title 28, U. S. C. 2321, 2323; Title 47, U. S. C. 402(a), must be construed to permit such interveners to submit pertinent evidence and advance reasonable contentions *dehors* the administrative record. We repeat that we do not advocate that the Court should conduct a trial *de novo* upon such evaluations or evidence. But we submit that the Court is empowered to suspend the Commission's order and compel it to hear and weigh pertinent evidence and sensible contentions which first appear at the instance of an intervener in the review proceeding.

The Commission's suggestion that this appellant was derelict in not appearing at its Rule-Making hearings points up the invalidity of the order complained of. Such order was promulgated in violation of the notice requirements of the Administrative Procedure Act, Title 5 U. S. C., § 1001, *et seq.*

Section 4 (a) of the Administrative Procedure Act provides (Title 5, U. S. C., § 1004a):

"General notice of proposed rule-making shall be

published in the Federal Register * * * and shall include * * * (3) either the terms or substance of the proposed rule or a description of the subjects and issues involved."

Section 4(e) of the Act (Title 5, U. S. C., § 1004e) requires the Court to "(B) hold unlawful and set aside agency action, findings and conclusions found to be * * * (4) without observance of procedure required by law."

The most careful reading of the Notice of Proposed Rule-Making issued by the Commission on July 11, 1949, would lull into a false sense of security a party in the position of this appellant, or any television manufacturer who owned no basic patents or any distributor or retailer of television receivers. Paragraph 13 (a) of the Notice advised "persons with relevant information [to] file proposals in accordance with Appendix A * * * and * * * be prepared to submit information * * * with respect to modification of transmitters and receivers to provide the degree of compatibility contemplated by Appendix A, Paragraph II-C-2." (R. 21.) Paragraph II-C of Appendix A read as follows:

> "It is proposed to consider changes in Transmission Standard for Channels 2 through 55 *only upon a showing in these proceedings that:*
>
> * * * * *
>
> "2. Existing television receivers designed to receive television programs transmitted in accordance with present transmission standards will be able to receive television programs transmitted in accordance with the proposed new standards *simply by making relatively minor modifications in such existing receivers.*" (Italics supplied.) (R. .....)

In the context of such proposed rule-making, this appellant had nothing to fear and possessed no relevant information to offer the Commission. Indeed, in this Notice,

the Commission announced the prospects for an orderly transition to color television broadcasting which would enhance the future of TV broadcasting and manufacturing and offer more fruitful employment opportunities to the members of the Union.

Yet the Commission concluded its Rule-Making proceedings by adopting color television broadcasting standards which (1) will produce no signal at all on existing receivers without substantial modifications therein; (2), on most receivers extant, will produce only a degraded black-and-white picture after major modifications, and (3) will make possible color pictures on certain existing, but antiquated, small receivers (12½ inches or less) by the addition of equipment at a cost of from one and a half to five times (at the Commission's own estimates) the value of such existing smaller receivers.

Nothing in the Commission's Notice suggested the possibility that broadcast standards would be fixed whereby the manufacturing industry would be forced to manufacture sets in the smaller sizes which the public had already found unsatisfactory. Certainly nothing in the Notice indicated that the Commission would establish a new additional standard for black-and-white broadcasting—405 lines, 48 black-and-white fields per second, with about 40% of the picture elements contained in the previously established black-and-white broadcasting standard of 525 lines and 60 fields per second.

In promulgating a second standard of black-and-white broadcasting, the Commission completely ignored the inescapable fact, that should CBS broadcasting standards be adopted, for the vast majority of the nation's set owners,—the owners of sets with tubes larger than 12½ inches or of sets with tubes 12½ inches or smaller combined with radio, phonograph or both,—a color conversion will be im-

possible. The greater market likelihood is that they will not discard their receivers for smaller sets built or adapted for CBS color. The adaptation of their sets for receipt of the CBS signal in degraded black-and-white would be the only way in which they would be able to enjoy CBS-style broadcasts. The principal reality which flows from the Commission's order for the majority of receiver owners is not color broadcasting but a double standard of black and white broadcasting.

Accordingly, for these reasons alone, we respectfully submit that the Commission's procedures violated the Administrative Procedure Act, in that they did not, by proper notice, afford to persons interested an opportunity to offer information concerning broadcasting standards encompassing (1) actual incompatibility in the new broadcasting system, (2) major modifications in existing receivers to receive only a black-and-white signal, (3) establishment of two standards of black-and-white broadcasting, and (4) the imposition of smaller receivers upon a public which has rejected such sizes in the open market. Yet such are the components of the Commission's order here under attack.

CONCLUSION.

It is respectfully submitted that for the reasons stated the judgment of the Court below should be reversed.

ALFRED KAMIN,
Counsel for Appellant, Local 1031, International Brotherhood of Electrical Workers, AFL.

APPENDIX A.

Text of Statutes Involved.

Communications Act of 1934, as amended (47 U. S. C. § 151 *et seq.*).

§ 402. (a) The provisions of Title 28, relating to the enforcing or setting aside of the orders of the Interstate Commerce Commission, are made applicable to suits to enforce, enjoin, set aside, annul, or suspend any order of the Commission under this chapter (except any order of the Commission granting or refusing an application for a construction permit for a radio station, or for a radio station license, or for renewal of an existing radio station license, or for modification of an existing radio station license, or suspending a radio operator's license), and such suits are authorized to be brought as provided in such Title 28. (48 Stat. 1093, as amended, 50 Stat. 197, 63 Stat. 108).

Judiciary and Judicial Procedure (Title 28 U. S. C.).

Sec. 2321. *Procedure generally; process.*

The procedure in the district courts in actions to enforce, suspend, enjoin, annul or set aside in whole or in part any order of the Interstate Commerce Commission other than for the payment of money or the collection of fines, penalties and forfeitures, shall be as provided in this chapter.

The orders, writs, and process of the district courts may, in the cases specified in this section and in the cases and proceedings under sections 20, 23, and 43 of Title 49, run, be served, and be returnable anywhere in the United States. (June 25, 1948, ch. 646, Sec. 1, 62 Stat. 969, amended May 24, 1949, ch. 139, Sec. 115, 63 Stat. 105.)

SEC. 2322. *United States as party.*

All actions specified in section 2321 of this title shall be brought by or against the United States. (June 25, 1948, ch. 646, Sec. 1, 62 Stat. 969, eff. Sept. 1, 1948.)

SEC. 2323. *Duties of Attorney General; intervenors.*

The Attorney General shall represent the Government in the actions specified in section 2321 of this title and in actions under sections 20, 23, and 43 of Title 49, in the district courts, and in the Supreme Court of the United States upon appeal from the district courts.

The Interstate Commerce Commission and any party or parties in interest to the proceeding before the Commission, in which an order or requirement is made, may appear as parties of their own motion and as of right, and be represented by their counsel, in any action involving the validity of such order or requirement or any part thereof, and the interest of such party.

Communities, associations, corporations, firms, and individuals interested in the controversy or question before the Commission, or in any action commenced under the aforesaid sections may intervene in said action at any time after commencement thereof.

The Attorney General shall not dispose of or discontinue said action or proceeding over the objection of such party or intervenor, who may prosecute, defend, or continue said action or proceeding unaffected by the action or nonaction of the Attorney General therein. (June 25, 1948, ch. 646, Sec. 1, 62 Stat. 970; amended May 24, 1949, ch. 139, Sec. 116, 63 Stat. 105.)

SEC. 2324. *Stay of Commission's order.*

The pendency of an action to enjoin, set aside, annul, or suspend any order of the Interstate Commerce Commission shall not of itself stay or suspend the operation of the order, but the court may restrain or suspend, in whole or

in part, the operation of the order pending the final hearing and determination of the action. (June 25, 1948, ch. 646, Sec. 1, 62 Stat. 970, eff. Sept. 1, 1948.)

SEC. 2325. *Injunction; three-judge court required.*

An interlocutory or permanent injunction restraining the enforcement, operation or execution, in whole or in part, of any order of the Interstate Commerce Commission shall not be granted unless the application therefor is heard and determined by a district court of three judges under section 2284 of this title. (June 25, 1948, ch. 646, Sec. 1, 62 Stat. 970, eff. Sept. 1, 1948.)

Administrative Procedure Act (5 U. S. C. § 1001 *et seq.*)

§4. Except to the extent that there is involved (1) any military, naval, or foreign affairs function of the United States or (2) any matter relating to agency management or personnel or to public property, loans, grants, benefits, or contracts—.

(a) *Notice.*—General notice of proposed rule making shall be published in the Federal Register (unless all persons subject thereto are named and either personally served or otherwise have actual notice thereof in accordance with law) and shall include (1) a statement of the time, place, and nature of public rule making proceedings; (2) reference to the authority under which the rule is proposed; and (3) either the terms or substance of the proposed rule or a description of the subjects and issues involved. Except where notice or hearing is required by statute, this subsection shall not apply to interpretative rules, general statements of policy, rules of agency organization, procedure, or practice, or in any situation in which the agency for good cause finds (and incorporates the finding and a brief statement of the reasons therefor in the rules issued) that notice and public procedure thereon are impracticable, unnecessary, or contrary to the public interest.

* * * * *

(e) *Scope of Review.*—So far as necessary to decision and where presented the reviewing court shall decide all relevant questions of law, interpret constitutional and statutory provisions, and determine the meaning or applicability of the terms of any agency action. It shall (A) compel agency action unlawfully withheld or unreasonably delayed; and (B) hold unlawful and set aside agency action, findings, and conclusions found to be (1) arbitrary, capricious, and abuse of discretion, or otherwise not in accordance with law; (2) contrary to constitutional right, power, privilege, or immunity; (3) in excess of statutory jurisdiction, authority, or limitations, or short of statutory right; (4) without observance of procedure required by law; (5) unsupported by substantial evidence in any case subject to the requirements of sections 1006 and 1007 of this title or otherwise reviewed on the record of an agency hearing provided by statute; or (6) unwarranted by the facts to the extent that the facts are subject to trial *de novo* by the reviewing court. In making the foregoing determinations the court shall review the whole record or such portions thereof as may be cited by any party, and due account shall be taken of the rule of prejudicial error. (60 Stat. 243, 5 U. S. C. § 1009.)

APPENDIX B.

TABLE 1.

TELEVISION SETS—PRODUCTION—1950*

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Table Model													
Without Conventional Radio:													
Under 10"				4,590	290	500	10	40	40	20	960	170	
10" or 11"				6,880	1,290	60	10	2,490	1,070	—	2,070	130	
12", 13", 14" or 15"	214,270	210,190	323,110	160,390	126,150	76,320	56,450	69,070	50,850	34,240	100,260	33,410	2,888,960
16", 17" or 18"				93,670	98,880	125,390	67,140	151,990	211,380	203,960	164,530	250,230	
19" and over				10	30	140	3,030	7,570	2,310	10,730	3,990	18,590	
Projection				—	—	—	—	—	—	—	—	60	
With Conventional Radio (AM or FM or both):													
Under 10"				—	—	—	—	—	—	—	—	—	
10" or 11"				100	—	—	—	—	—	—	10	70	
12", 13", 14" or 15"	8,710	4,500	5,470	1,700	2,600	1,520	—	560	360	2,110	1,550	90	52,600
16", 17" or 18"				1,980	1,300	1,050	980	2,960	1,500	8,420	3,180	1,420	
19" and over				—	—	—	—	—	—	330	60	70	
Projection				—	—	—	—	—	—	—	—	—	
Console or Consolette Without Conventional Radio:													
Under 12"				30	30	40	—	30	—	—	20	80	
12", 13", 14" or 15"	177,830	212,540	286,940	75,590	51,710	71,860	33,410	41,540	35,080	4,220	54,890	8,290	
16", 17" or 18"				136,310	154,670	187,450	115,110	305,520	341,330	339,390	273,650	342,030	3,568,060
19" and over				6,680	4,460	1,870	13,480	46,550	62,150	70,100	35,240	76,070	
Projection				620	50	130	—	20	10	90	160	790	
With Conventional Radio (AM or FM or both):													
Under 12"				—	—	—	—	—	—	—	—	—	
12", 13", 14" or 15"	13,830	15,290	15,610	2,240	3,080	1,430	360	860	1,220	2,620	2,070	240	252,000
16", 17" or 18"				1,200	1,740	5,710	6,060	19,640	21,650	17,980	12,850	12,000	
19" and over				9,570	10,040	12,210	6,880	12,220	9,520	9,340	12,120	12,420	
Projection				—	—	—	—	—	—	—	—	—	
Phonograph Combinations With or without Conventional Radio:													
Under 12"				70	10	—	10	80	90	—	40	110	
12", 13", 14" or 15"	24,060	37,380	55,470	23,430	6,000	1,350	1,860	11,070	11,140	6,120	10,640	5,660	702,180
16", 17" or 18"				16,270	21,940	13,200	21,520	42,610	78,420	110,690	52,680	75,560	
19" and over				1,270	1,730	2,270	1,190	5,780	15,680	17,940	7,830	21,010	
Projection				—	—	—	—	—	—	—	—	—	
Total	438,700	479,900	686,600	542,600	486,000	502,500	327,500	720,600	843,800	838,300	738,800	858,500	7,463,800
No. of above TV Sets with FM	44,560	56,140	75,290	43,610	36,050	27,690	53,410	64,030	82,760	84,800	91,770	96,010	756,120

* Source: Radio and Television Manufacturers Association.

TABLE 2.

TELEVISION SETS—PRODUCTION—1950*

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Totals
All Models													
Under 10"				4,590	290	500	10	40	40	20	960	170	6,620
10" or 11"				7,080	1,330	100	20	2,600	1,160	—	2,140	390	14,820
12", 13", 14" or 15"	438,700	479,900	686,600	263,350	189,540	152,480	92,080	123,100	98,650	49,310	169,410	47,690	2,790,810
16", 17" or 18"				249,430	278,530	332,800	210,810	522,720	654,280	680,440	506,890	681,240	4,117,140
19" and over				17,530	16,260	16,490	24,580	72,120	89,660	108,440	59,240	128,160	532,480
Projection				620	50	130	—	20	10	90	160	850	1,930
Total	438,700	479,900	686,600	542,600	486,000	502,500	327,500	720,600	843,800	838,300	738,800	858,500	7,463,800

* Source: Radio and Television Manufacturers Association.

TELEVISION SETS—PRODUCTION—1951

	January		February
	No. of sets mfd.	%	No. of sets mfd.
15" and smaller	30,904	4.78	33,959*
16", 17", 18"	540,445	83.70	594,645*
19" and larger	74,367	11.52	81,844*
Total	645,716	100.00	710,448**

* Estimated.

** Actual RTMA Production estimate for February.

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Supreme Court of the United States

OCTOBER TERM, 1950.

No. 565.

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., RCA VICTOR DISTRIBUTING CORPORATION, *et al.*,

Appellants,

against

UNITED STATES OF AMERICA, FEDERAL COMMUNICATIONS COMMISSION, and COLUMBIA BROADCASTING SYSTEM, INC.,

Appellees.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES FOR THE NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION.

REPLY BRIEF FOR APPELLANTS

RADIO CORPORATION OF AMERICA
NATIONAL BROADCASTING COMPANY, INC.
RCA VICTOR DISTRIBUTING CORPORATION

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March 26, 1951.

TABLE OF CONTENTS.

	PAGE
INTRODUCTION	1
ARGUMENT:	
POINT I. Reply to Argument that the Commission Acted in the Public Interest in Adopting an Incompatible System	2
The Principle of the Standard Gauge	3
The Principle of the Standard Gauge as Applied to Color	6
The Public Interest in Continuity of Service	10
Encouragement of Research	11
Converters for the RCA System	12
Compatibility	13
Incompatibility	14
POINT II. Reply to Argument that the Commission's Refusal to Look at the RCA Improvements was Reasonable	17
The Commission's Desire to Look at Improvements	19
The Probability of Improvement	21
The Time to Look	24
The Refusal to Look	26
POINT III. The Action of the Commission in Ruling Out Compatible Color in Competition With Incompatible Color is Unlawful	29
No Authority to Rule Out Compatible Color	31
Absence of Findings On Competition Between Systems	33
a. The Issue was Presented to the Commission	33
b. The Commission Made No Findings on The Issue Presented	35
c. Purported Justification	37

PAGE

Arguments of Counsel Against Competition.... 40

Arguments of Counsel Are No Substitute For Findings 44

POINT IV. Reply to Argument that Substantial Evidence is Not Necessary..... 45

POINT V. Reply to Argument that the Commission's Record is Adequate and its Action Supported by Substantial Evidence..... 49

Admitted Inadequacy of Administrative Record 49

Lack of Substantial Evidence to Support the Commission's Findings 51

1. The CBS Color System..... 52

a. Convertibility 52

b. Adaptability: Quality of Black and White Picture From Color..... 54

c. Equipment Considerations 57

d. Flicker and Brightness..... 59

e. Registration — Color Break-Up and Fringing 61

2. The RCA Color System..... 62

a. Flicker 62

b. Brightness 62

c. Compatibility: Quality of Black and White Pictures From Color..... 63

d. Color Fidelity..... 65

e. Registration 67

f. Resolution 68

g. Picture Texture..... 69

h. Convertibility 69

i. Equipment Considerations..... 70

PAGE

The Record as a Whole Does Not Support the Criteria Chosen by the Commission 73

POINT VI. Reply to Argument That the Court Below Afforded Appellants Proper Judicial Review 74

CONCLUSION 77

Table of Authorities.

Cases.

	PAGE
Ashbacker Radio Corp. v. *Federal Communications Commission*, 326 U. S. 327	36
Federal Communications Commission v. *Sanders Brothers Radio Station*, 309 U. S. 470	42
Federal Communications Commission v. *WJR, The Goodwill Station, Inc.*, 337 U. S. 265	76
Florida v. *United States*, 282 U. S. 194, 215	36
General Electric Co. v. *Federal Radio Commission*, 31 F. 2d 630, cert. dismissed, 281 U. S. 464	10-11
Ex Parte Harley Davidson Motor Co., 259 U. S. 414	76
Interstate Commerce Commission v. *Jersey City*, 322 U. S. 503	21
Jacob Siegel Co. v. *Federal Trade Commission*, 327 U. S. 608	36, 38
Lutcher & Moore Lumber Co. v. *Knight*, 217 U. S. 257	76
National Broadcasting Company v. *United States*, 319 U. S. 190	3, 24, 29, 45
National Labor Relations Board v. *The Pittsburgh Steamship Co.*, ... U. S. ....., 71 S. Ct. 453	46, 74
Oklahoma Natural Gas Co. v. *Russell*, 261 U. S. 290	76
Panama Refining Co. v. *Ryan*, 293 U. S. 388	39
Securities and Exchange Commission v. *Chenery Corp.*, 318 U. S. 80	36
Simmons v. *Federal Communications Commission*, 145 F. 2d 578 (D. C. Cir.); 169 F. 2d 670 (D. C. Cir.), cert. denied, 335 U. S. 846	39
Thomas Paper Stock Co. v. *Porter*, 328 U. S. 50	39

PAGE

United States v. *Baltimore & Ohio R. R.*, 293 U. S. 454 ..... 36, 39

United States v. *Chicago M. St. P. & P. R. R.*, 294 U. S. 499 39

United States v. *Pierce Auto Lines*, 327 U. S. 515 21

Universal Camera Corp. v. *National Labor Relations Board*, ... U. S. ....., 71 S. Ct. 456 ..... 46, 74, 75

Wong Yang Sung v. *McGrath*, 339 U. S. 33 48

Yonkers v. *United States*, 320 U. S. 685 39

STATUTES.

Administrative Procedure Act (60 Stat. 238, 243; 5 U. S. C. §1001 *et seq.*) 28, 45

Section 4 29

Section 7 48

Section 8 48

Section 10 46-49

Communications Act of 1934 (48 Stat. 1082, 1093; 50 Stat. 197; 63 Stat. 108; 47 U. S. C. §151 *et seq.*) 2, 29

Section 303(e) 32

OTHER AUTHORITIES.

Conant, On Understanding Science (1947) 22

68 Cong. Rec. 3035 (1927) 32

16 FCC Ann. Rep. 13 (1950) 6

FCC Mimeo 49851 12

FCC, Report of the Commission in the Matter of Order No. 65 Setting Television Rules and Regulations for Further Hearing, Docket No. 5806 (May 28, 1940) 4, 5, 7

PAGE

FCC, Report, Docket No. 5806 (May 3, 1941) 8

Hearings before the Committee on Interstate and Foreign Commerce, U. S. Senate, 81st Cong., 1st Sess., on the Nomination of E. M. Webster to the Federal Communications Commission 15

Hearings before the Senate Committee on Interstate Commerce, 76th Cong., 3rd Sess. (1940) on S. Res. 251 7

Legislative History of the Administrative Procedure Act, Sen. Doc. No. 248, 79th Cong., 2d Sess. 47

Maclaurin, Invention and Innovation in the Radio Industry (1949) 12

Report of the Condon Committee, Sen. Doc. No. 197, 81st Cong., 2d Sess. 28

Supreme Court of the United States

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RADIO CORPORATION OF AMERICA
NATIONAL BROADCASTING COMPANY, INC.
RCA VICTOR DISTRIBUTING CORPORATION

Introduction.

The only difference between appellees' position below and their position here lies in their repudiation of the necessity for substantial evidence.

Administrative "expertise" is the current defense of a decision that flies in the face of common sense, the evidence in the record, and the inner inconsistencies of the Commission's decision itself.

The Commission cannot, by the mere act of arriving at an administrative finding or conclusion, establish that com-

patibility is not of the first importance to television, including color television. Nor can the Commission change the facts of life by administrative findings and conclusions and establish that high definition is not important to picture quality or that the public does not want large size pictures.

The whole tenor of appellees' brief is based upon the assumption that administrative findings can *make* facts, and put realities beyond the reach of judicial review.

POINT I.

Reply to Argument that the Commission Acted in the Public Interest in Adopting an Incompatible System.

It is noteworthy that in their long brief appellees nowhere refer to the 45,000,000 people who would not be able to receive a program broadcast in accordance with the standards adopted by the order.

This is the significance of incompatibility under the new standards. This is the measure of the loss of service to the listening public that incompatibility involves—a service that can be restored only by expensive and troublesome "adaptation" of the 12,000,000 sets now in the hands of the public (R. 147-48, 575, 602, 794, 876; Tr. 2197,* 4829, 4949, 5105-06, 9413-14, 9554, 10022-23).

The inescapable importance of incompatibility bears directly upon the guiding statutory standard for the Commission as set forth in the Communications Act—the "public interest, convenience or necessity". This Court has said that under these words

---

* Reference is made in this manner to the transcript of testimony before the Commission. By order of this Court on March 5, 1951 leave was granted to dispense with the printing of the transcript.

> "The 'public interest' to be served under the Communications Act is . . . the interest of the *listening public . . .*"*†

The majority of the District Court recognized the clear relevance of this to the factor of compatibility when it said:

> "Perhaps the most substantial attack made upon the Commission's order is the adoption of standards which call for an incompatible system which, as admitted by all the parties including the defendants and CBS, is less desirable than a compatible system" (R. 877).

Judge La Buy in dissenting stated:

> "It is conceded by all and it is self-evident that the best system of color television is a compatible one; that is, a system requiring no change whatever in existing receivers for the reception of black and white as well as color pictures. Indeed, compatibility is the coveted goal of all engineers and scientists engaged in the television industry" (R. 879).

The Principle of the Standard Gauge.

Appellees do not, as of course they cannot, deny that the Commission in 1940 announced the principle that the larger and more effective use of radio in the public interest requires that television standards be set on the basis

> "which will enable *every transmitting station to serve every receiver within its range*"

and that

> ". . . a serious question of public interest would arise in the future if the Commission should specify ex-

* *National Broadcasting Company* v. *United States*, 319 U. S. 190, 216.

† Italics ours throughout.

ternal transmitter performance capabilities differing from the operating capabilities of receivers in the hands of the public.

* * * * * *

"... these basic standards—*the standard gauge* they may be termed—should afford within their limits reasonable flexibility for future advances in the science of television broadcasting."*

Appellees have admitted that:

"In the entire history of broadcasting there always has been a single set of standards for . . . the particular service . . ." (Appellees' Motion to Affirm, p. 19).

They now however attempt to avoid this consistent principle. They seek to argue that incompatible color is a separate service from black and white (Appellees' Brief, pp. 93-96).

The inner and fatal inconsistency of appellees' position shows that no such distinction can be made.

In fact, the argument that color and black and white are separate services is flatly inconsistent with the whole rationale of the Commission's decision.

If it were really true that color television were a different service from black and white television, there would be no problem of incompatibility. It is the inescapable fact that color television is the same service as black and white that gives rise to the incompatibility problem, and it is the incompatibility problem primarily that has led the Commission to make the wrong decision in this case.

---

* FCC, REPORT OF THE COMMISSION IN THE MATTER OF ORDER NO. 65 SETTING TELEVISION RULES AND REGULATIONS FOR FURTHER HEARING, Docket No. 5806, pp. 2, 5, 27, 28 (May 28, 1940). The record in Docket No. 5806 was incorporated by reference in the proceedings here under review at the request of Commission counsel (Tr. 8873).

For appellees to come before this court and argue out of one side of their mouths that color is a separate service from black and white television, even though it concededly must exist in the same set of channels as black and white, and to argue out of the other side of their mouths that the CBS system must be adopted now, because in effect it is part of the same service, should be enough to establish the arbitrary and capricious nature of the order under review.

This is the fundamental defect in appellees' attempt to rationalize the Commission's action on the ground that color and black and white are two separate services. As long as the Commission's order stands, there is no way the broadcaster can transmit color signals simultaneously with signals which will produce a picture on the 12,000,000 receiving sets owned by the public (R. 558-60, 609; Tr. 3411; *cf.* Tr. 4734).

If color and black and white were truly separate services, the Commission could have no legitimate concern about the number of receivers in the hands of the public which cannot get CBS color even as degraded black and white (R. 147-48, 559, 575, 794-95, 876; Tr. 2197, 3411, 4750-51, 4829, 4949, 5105-07, 5133-34, 6442, 6546, 9413-14, 9553-54, 9962, 10022). If they were separate services, the Commission would never have attempted its *tour de force* of changing the most compelling reason for rejection of the CBS system—its incompatibility—into the sole reason for its adoption now.

It is clearly an afterthought for appellees to argue that the principle, consistently followed by the Commission since 1940, of insuring that

> "every transmitting station [must] serve every receiver within its range"*

* FCC, REPORT, Docket No. 5806, p. 2 (May 28, 1940).

has no application here because incompatible color is a separate service from black and white. Unlike AM and FM, which operate in *different* portions of the radio spectrum and are therefore different broadcast services, black and white and color television operate in the *same* portion of the spectrum and are therefore the same service.

The Commission has always classified services according to the band of the spectrum which they occupy.* If they occupy different bands, they are different services. Thus, as indicated, AM and FM radio are separate services. Television, on the other hand, whether black and white or color, occupies the same portion of the frequency spectrum and is hence a single service.

That color is not a separate service from black and white television was conceded by appellee CBS as early as 1940. Dr. Goldmark, its chief engineering witness, then stated:

> "I recommend we stop making a distinction between color and black and white."**

The Principle of the Standard Gauge as Applied to Color.

Appellees assert that the principle announced by the Commission in May 1940 that television standards should be set on the basis

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* Thus the 16th Annual Report of the Commission to Congress, transmitted December 29, 1950 (after the order became effective), lists AM as a separate service, FM as a separate service and "television" as a separate service. It does *not* list color television as one service and black and white television as another. On the contrary, it expressly lists "Color television" as a *sub-division* under "Television (TV) broadcast service". This use of the singular by the Commission is to be noted and contrasted with appellees' argumentation in this Court that color is a separate service (16 FCC ANN. REP. p. ix (1950)).

** Official Minutes of 8th Meeting—Part I of Panel 1, NTSC, p. 14, December 11, 1940. The proceedings of Panel 1 were submitted as Exhibit 254 in Docket No. 5806 at p. 2303.

> "'. . . which will enable every transmitting station to serve every receiver within its range'"*

has no reference to color television because "There was no issue of color television before the Commission at that time . . ." (Appellees' Brief, p. 95). This is flatly contradicted by the statement of the Chairman of the Commission himself in April 1940.

Mr. Fly, then Chairman of the Commission, stated before the Senate Interstate Commerce Committee in April 1940:

> " . . . in a few months we may be able to fix these *basic standards,* thus giving the industry an opportunity to get on to *the standard-gage track.* Then, within the limits of that standard gage, they can go to town. They can streamline the cars and *paint them fancy colors;* they can put in various different conveniences; they can increase the speeds of trains; they can do many other things."**

The RCA color system of today does precisely what the then Chairman of the Commission said was to be permitted. It hauls not only black and white cars but color cars as well over the standard gauge track that is already in place.***

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* FCC, REPORT, Docket No. 5806, p. 2 (May 28, 1940).

** *Hearings before the Senate Committee on Interstate Commerce*, 76th Cong., 3rd Sess. (1940), on S. Res. 251, a resolution requesting the Committee on Interstate Commerce to investigate the actions of the Federal Communications Commission in connection with the development of television, p. 8.

*** The standard gauge is the 525 lines, 60 fields which has been in effect for television for 10 years (R. 569). The RCA color system operates on these same standards—525 lines, 60 fields—while CBS uses 405 lines and 48 color fields—a different and narrow gauge (R. 132, 573, 585).

In their brief appellees assert that the RCA color standards are not in every respect identical with the existing television standards.

(Footnote continued on next page)

Appellees are also wrong in stating that in May 1941, the Commission "proposed different standards for color television—375 lines, 60 frames, and 120 fields" (Appellees' Brief, p. 95). The significant fact is to the contrary.

In May 1941 the Commission declined to adopt different standards for color. It explicitly stated at that time that the line and field frequencies for color transmission "is a matter for *future* consideration".*

In making this statement the Commission obviously and wisely reserved its decision on color standards to be made in the context of the facts as they should later exist. In 1940 no compatible color system had been developed. Today a compatible color system exists.

Appellees referred to the fact that in 1947 the Commission implied that color standards which might be adopted sometime in the future need not necessarily be compatible (Appellees' Brief, pp. 95-96). Again appellees have referred to the words of the Commission but not to its action. In 1947 the Commission *rejected* a system which would have departed from the principle announced in 1940 that every transmitter must serve every receiver in the area.

The context of the color decision of today shows that the Commission's carefully guarded statements of 1940 and 1947, to the effect that color standards in the future *might* be different from black and white, have little significance in the determination of the principle of standardization to be

---

(Footnote continued from preceding page)

Whether or not this is true, there is no dispute that they are identical in the respect that both use 525 lines and 60 fields and the RCA system is therefore compatible. This means that both use the standard gauge and that the Commission's principle of 1940 that every transmitter must serve every receiver would be fully complied with under the RCA system.

* FCC, REPORT, Docket 5806, p. 3 (May 3, 1941).

used now. The fundamental facts in this respect are set forth at page 45 of appellants' main brief.

Appellees did not even attempt to meet these facts in their brief.

Those facts are:

(1) in 1940 there were virtually no television receivers outstanding, and very few in March 1947;

(2) in so far as it was contemplated in 1947 that color might require different standards from black and white, it was also contemplated that color occupy *a different portion of the frequency spectrum* than black and white;

(3) it is now accepted that color will occupy the *same* portion of the frequency spectrum as black and white; and

(4) by the time the television audience reached the size it now is—45,000,000 people—compatibility became a practical necessity.

If we look then to what the Commission did in 1940 and 1947, as distinguished from what appellees say it said, it is clear that *until this case the Commission has never departed from the principle that every television transmitter must serve every television receiver within its area.* This principle is no better illustrated than by the admission of the President of CBS himself. He stated:

> "Normally in the field of radio and television, *when a consumer buys a receiver he knows that he can, in general, get all the signals in his area. That has usually been considered as the purpose of standards.*" (Tr. 7117)

The Public Interest in Continuity of Service.

The fact that 45,000,000 people who now receive television service costing $150,000,000 a year, as a result of having invested $3,000,000,000 in 12,000,000 television receivers (Appellants' Brief, pp. 1, 11-12; R. 607-08), will not continue to be able to receive that service from every transmitting station within range is referred to by appellees as "merely a temporary problem" (Appellees' Brief, p. 91).

It is suggested by appellees that these people may either discard their $3,000,000,000 investment and purchase new receivers capable of receiving CBS broadcasts, or spend an estimated half billion dollars to adapt their sets to receive a degraded black and white picture having less than half the detail of present black and white television pictures (R. 147-48, 575, 602, 594-95, 876; Tr. 2197, 3280, 3446, 3971, 4829, 4949, 5105-07, 9413-14, 9554, 10022-23). This latter expenditure is referred to as a "relatively minor amount of money" (Appellees' Brief, p. 91; see also R. 157).

The Court of Appeals of the District of Columbia was confronted with a similar problem in *General Electric Co.* v. *Federal Radio Commission*, 31 F. 2d 630 (D. C. Cir.) *cert. dismissed*, 281 U. S. 464. Pioneer radio station WGY in Schenectady had been authorized to broadcast at a stated frequency with unlimited time of operation. Because the station shared a frequency with another station in Oakland, California the Commission sought to revise WGY's license to require it to cease operating after certain evening hours when its broadcasts might interfere with reception of the Oakland station in California.

As stated by the court:

> "It appears that within 100 miles of the [Schenectady] station there is a very large population, both urban and rural, estimated to number more than

> 2,000,000 persons, residing in the states of New York, Massachusetts, Vermont, and New Hampshire, who in large part are dependent upon this station for reliable and regular broadcasting service, and that, if the station should be silenced during the early hours of the evening, as determined by the commission, the general public within this territory would be seriously prejudiced. In view of the service to the art hitherto rendered by WGY, and still continued by it, with the resulting advantage to the public, and in view, also, of the 'public convenience, interest, and necessity' of so great a constituency for full time operation of the station, it appears that *the restriction complained of is not reasonable and should not be enforced.*" (p. 634)

This judicial interpretation of the public interest as it affects 2,000,000 people is to be compared with the 45,000,000 people who are concerned with television service under the order.

Encouragement of Research.

In their main brief appellants pointed out that neither the larger nor the more effective use of radio as respects television would result if the standards chosen should be proven wrong by later research (Appellants' Brief, p. 47). It was also pointed out that in 1940 the Commission had recognized that the nature of television standards requires that they should only be fixed after a full investigation of possibilities and substantially unanimous concurrence within the industry as to their basis.

Appellees have attempted to take issue with the latter statement by asserting that the Commission set standards for black and white television in 1941

> "... in the face of violent disagreement among various segments of the industry." (Appellees' Brief, p. 105)

As their reference on the setting of standards at that time appellees cited FCC Mimeo 49851. That mimeo states as follows:

> "The Commission now finds the industry entirely in agreement that television broadcasting is ready for standardization. The standards as finally proposed by the NTSC [National Television System Committee of the industry] . . . represent, with but few exceptions, *the undivided engineering opinion of the industry*" (FCC Mimeo 49851, p. 2).

Appellees have thus flatly misstated the facts in respect of the status of engineering opinion within the industry at the time of the adoption of the existing television standards.*

Converters for the RCA System.

Appellees also assert in defense of the Commission's action that under the RCA system existing set owners cannot receive color pictures on their sets, "which are incapable of being converted". (Appellees' Brief, p. 90).

These are wholly unwarranted statements.

RCA demonstrated on the record on April 6, 1950 two 1948 model television receivers which had been modified to include color components (Tr. 8130-32). These are described in Exhibit 382, received by the Commission in evidence during the testimony of Dr. Engstrom (Tr. 7930).

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* The position of appellants in this respect is also confirmed in the definitive study of the radio and television industry. MACLAURIN, INVENTION AND INNOVATION IN THE RADIO INDUSTRY (1949). The adoption of television standards is discussed in Chapter X, entitled "Government Regulation and Technical Progress—FM and Television: 1900-1941".

In the petition of October 4, 1950, RCA offered to show to the Commission two other prototypes of converters.* The Commission refused to look.

It is therefore highly improper for the Commission now to say that with the RCA system existing set owners cannot receive color pictures on their sets which "are" incapable of being converted.

This misrepresentation of the RCA system, in respect of its *present* ability to be converted, illustrates in the most compelling way the unreasonableness of the Commission in the denial of RCA's petition of October 4.

This Court is now told flatly that under the RCA system sets "are" incapable of being converted. The fact is the Commission was petitioned to view converters and refused to look.

Compatibility.

Appellees assert that appellants' position in respect of compatibility is that receiving color transmissions in black and white on existing sets is more important than color itself (Appellees' Brief, p. 90).

This wholly distorts the position of appellants. The achievement of compatibility was a scientific accomplishment of first importance to color itself. For it is compatibility that makes it economically practical for the broadcaster and the sponsor to broadcast in color, their best programs, in choice viewing time (R. 608; Tr. 7229-31, 8027; *cf.* Tr. 2983).

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* As more fully set forth on page 26 in the discussion of this petition below, RCA offered to show to the Commission improvements in the performance of the RCA system "with particular reference to those points about which the Commission expressed doubts" in its First Report (R. 408-49). Thus RCA incorporated by reference points referred to in the First Report. One of these points was converters (R. 149).

With a compatible system the broadcaster does not have to wait for color receivers to appear in quantity (Tr. 7229-30). Nor does he have to confine color broadcasts to fringe time (Tr. 2980, 2983).

From the standpoint of the public interest, compatibility thus becomes of first importance in promoting color itself (R. 608-09; Tr. 7230-31). With a compatible system the broadcaster will have every urge to bring color to the public. Without it many cannot afford to do so.

It would be the greatest mistake to conclude that compatibility is simply a method of continuing black and white reception to present owners of receiving sets. The incompatibility of the color standards adopted, on the other hand, is bound to be an important factor in delaying the coming of a sound color service on a national basis (Tr. 2980, 2983, 7177, 7229-32, 8015-16, 8027, 8781, 10002-03).

Incompatibility.

Appellees assert that the Commission considered the compatibility situation and decided to pass up compatibility as a requirement for a sound color system in the public interest (Appellees' Brief, pp. 90-91). To support this assertion they cite the First Report in which the Commission referred to compatible systems as demonstrated "to date" (R. 156). But it was in the same Report that the Commission set forth its desire to look at improvements in the existing color systems (R. 165-66). Thus, the Commission itself recognized that what had been demonstrated up to May 1950 was not determinative of the case.

The Commission stated that its conclusion as to compatibility was based on a study of the "history of color development over the past ten years" (R. 156). But in saying this the Commission failed to point out that *many of these ten years were war years*, when the efforts of electronic engineers were addressed to imperative needs of

defense. Nor did it make any reference to the fact that the realization that color should operate in 6 megacycles came only in 1948—only about one year, instead of ten, before the color hearings commenced (R. 577-78; Tr. 2657-59; Exhibit 206).

Appellees' assertion that the choice was between color and compatibility is wholly without basis in fact. On the contrary, as Commissioner Webster stated in speaking of compatibility in a color system:

"That can be done . . ."*

It is a shocking exhibition of defeatism for the Commission to tell this Court that the electronics industry, which produced the dynamic art of television itself, lacks the capacity to achieve a satisfactory compatible system.

This is particularly true in view of the almost unanimous testimony of electronics experts who appeared before the Commission that a compatible system is possible, is desirable and, in fact, is necessary to safeguard the service of the people—now 45,000,000 people—who receive television service (R. 589; Tr. 3896, 4849-50, 5903, 8199-200, 8266, 8385-86, 9397, 9495, 9696, 9866, 10046-47, 10057).** It is also

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* *Hearings before the Senate Committee on Interstate Commerce*, 81st Cong., 1st Sess. (1949) on the nomination of E. M. Webster to the Federal Communications Commission, p. 20.

** Appellees endeavor to minimize the significance of incompatibility by asserting that "only 63 geographic points now have television service; there are 1336 other points for which stations are contemplated . . ." (Appellees' Brief, note 111, p. 92). This is perhaps the most misleading statistic in their brief.

The 63 points include major metropolitan areas such as Boston, Chicago, Los Angeles, Philadelphia, New York, and Washington, while the 1336 include places with a population as low as a few hundred (see R. 45-85).

While of course all people are important in dealing with television service, the impression sought to be conveyed by the ratio of 63 geographic points to 1336 geographic points, when translated into the number of people in the 63 points against the number in the 1336 points, is grossly misleading.

true in view of the fact that not a single witness before the Commission except appellee CBS favored the adoption of an incompatible system.

We have heard much in this case about the alleged unreadiness of the RCA color system.

But the fundamental fact of incompatibility in the CBS system shows that that system is far less ready, *on system fundamentals*, than the RCA system. Taking CBS' own story of ten years of research, it has yet to overcome the problem of incompatibility.

Incompatibility is a problem which should be solved *in the laboratory.* It should be dealt with as a research expense of the company which sponsors a color system. *It should not be dealt with at the expense of the public.* But the adoption of the CBS system is an attempt to transfer the expense of incompatibility to the public, which must buy adapters, at a cost of half a billion dollars, to overcome the defect of incompatibility in that system (R. 602, 876).

Incompatibility is a fundamental matter which cannot be dodged. *An incompatible system is nothing more nor less than a system that is not ready from the engineering standpoint.* The real name for an incompatible system is an unready system.

Appellants submit that the Commission acted contrary to its basic obligation to serve the public in adopting a color system in this fundamental state of unreadiness.*

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* Appellees have attempted to insinuate that the television industry did not push color because of an alleged desire to maintain the *status quo* of black and white production. This argument is to be contrasted with the fact that the very television industry of today was created by companies which started off as radio companies. If their interest lay in maintaining the *status quo* rather than in providing new and better electronic equipment for the public we would never have the television industry we have today. This dynamic industry thrives on change.

Controversy in respect of color television has arisen from the fact that leaders of the industry have felt it wrong to ask the public

(Footnote continued on next page)

POINT II.

Reply to Argument that the Commission's Refusal to Look at the RCA Improvements Was Reasonable.

The fact of great improvement in the RCA system during the latter part of the hearing is undisputed.

As stated by the majority of the District Court:

> "Admittedly, much progress was made during the latter portion of the hearings and, as claimed, after the hearings closed, in the development of a compatible system of color television. *Particularly was such progress made by RCA*, and as we view the situation the most plausible contention made by plaintiffs is that the Commission abused its discretion in refusing to extend the effective date of its order so that it might further consider the situation, and particularly the improvement which it is claimed had been made by RCA and others." (R. 871-72)

Even appellee CBS—who had told the Commission in October 1949 that "nothing" could improve the RCA system—admitted six months later that the RCA system had improved "a thousand percent" (Tr. 3585, 8882).

The same appellee had told the Commission as late as February 1950 that the Commission "may have *a long wait*" for the RCA tri-color tube (Tr. 6211). Twenty-four

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(Footnote continued from preceding page)

to invest in an inferior color system that is bound to be superseded by a good one. And, unless this order becomes effective, time has proved them right. The color standards urged by appellee CBS in 1940, had they been adopted, would have given us a system that flickered like the old-fashioned movies; and the color standards proposed by CBS and rejected by the Commission in 1947, had they been adopted, would have made a most wasteful use of the frequency spectrum. But appellee CBS has said that its system today is fundamentally the same as that proposed in 1947 and in 1940 (Tr. 3078, 8885-86; 8891-92; FCC Docket 7896, p. 369).

days later RCA demonstrated that tube to the Commission (Tr. 7475). Appellee CBS admitted, on cross-examination, that the tri-color tube "was an admirable accomplishment" (Tr. 11282).

Appellees seek to sidestep the significance of this improvement. They assert the Commission's First Report is still to be read as saying that there was no reasonable probability of improvement of the RCA equipment so the Commission had no choice. It had to take an incompatible system.

The importance of this position first of all is for what it does *not* claim. Appellees have not claimed that the RCA system was rejected because of alleged unsuitability in May 1950. They have retreated to the position that it was not adopted because it had not then been successfully developed "*and* . . . there is no reasonable probability that such a system will be developed" (Appellees' Brief, p. 90).

The interdependence of past and future here is clear. The Commission's position fails if it is unsupported on either ground.

As to the state of the development of the RCA system in the latter part of the hearing, we believe that the observation of the majority of the District Court and the admissions of appellee CBS speak for themselves. There are in addition the short but compelling statements of two of the Commissioners which have been referred to in our main brief (pp. 70-71).*

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* These may be compared with the reckless claim of appellees in the court below that the RCA system produces only "splotches of color in a laboratory" (Tr. of Proc. 240). Appellees seek to convey the same impression here by inference from a long review of alleged imperfections of RCA color equipment. The short answer to this laborious effort is indicated in the statement of the District Court set forth on page 17, *supra*, and in observations of some of the Commissioners themselves such as

> ". . . We have seen that [RCA] system and *it produced beautiful color*" (Tr. 6900).

The Commission's Desire to Look at Improvements.

The more remarkable of appellees assertions is its claim the Commission held that improvement for RCA was not possible. This, if true, would be an extraordinary finding for an administrative agency—especially one dealing in an art as dynamic as television.

Appellees misconceive the meaning of the First Report. For all its criticism of aspects of the RCA system, that Report can be read only as recognizing that the RCA system had shown such improvement that it should not be rejected without another look at further improvement.

If this were not so, *why did the Commission in the First Report say it wanted another look at*

> "*improvements in existing color systems* which have been informally called to our attention since the hearings closed."? (R. 165)

Why did the Commission want to have another look at these improvements if it were true, as appellees now argue, that the Commission had concluded the RCA system is not capable of improvement?

It violates common sense for appellees to construe the First Report as meaning the RCA system was not suitable *and* could not be improved, when that very Report says that the Commission wanted to see the RCA improvements.

It is true that its willingness to look at improvements was based on conditions. These were the acceptance, without a hearing, of "bracket standards" under the time schedule prescribed by the Commission (R. 166-68).

In their brief in this Court appellees assert that appellants "wholly distort" the action of the Commission

by describing bracket standards as an attempt "to coerce manufacturers". Appellees now say that

> "The bracket standards proposal was clearly an exploratory *suggestion* and a *request* for information . . ." (Appellees' Brief, p. 99)

It is interesting to compare this characterization by appellees in argument with the contemporaneous characterization of bracket standards by Commissioner Jones, in his separate opinion favorable to the CBS system. He stated that:

> "The Commission . . . as a part of this decision would *force* the industry to adopt bracket standards . . ." (R. 196)

This analysis by Commissioner Jones of what the Commission did in adopting bracket standards speaks for itself. It makes ridiculous appellees' argument here that bracket standards were a "suggestion" or "request". And it wholly supports the position of appellants.

We have then this situation: the Commission clearly stated in its First Report that it wanted to see the improvements in the RCA system. This however was subject to the bracket standards condition, which proved to be impossible of fulfillment (R. 166-68, 314-16, 870).

Even if it were assumed that the Commission is right in arguing that it was asking only for information rather than applying "force" in respect of bracket standards,* there is no dispute in the record that the bracket standards condition turned out to be impossible (R. 421-27, 430, 870).

The Commission was thus left with its express desire to see the improvements in the RCA system, subject only to a condition that had been swept away.

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* Both the illegality and impossibility of the bracket standards are discussed on pages 128-34 of appellants' main brief.

It was in these circumstances that RCA's petition of October 4, 1950 to look at its improvements was filed (R. 408-09). This was *before* the order was issued. Both this fact and the clearly expressed desire of the Commission itself to look at improvements distinguish this case from *United States* v. *Pierce Auto Lines*, 327 U. S. 515, and *Interstate Commerce Commission* v. *Jersey City*, 322 U. S. 503, cited by appellees on page 120 of their brief.

It is ridiculous to assert now, as appellees do in argument, that the RCA petition was filed at a time when it was known that the Second Report and order were about to issue (Appellees' Brief, p. 135). The parties to the hearing were asked to file comments on the First Report. They had no reason to suppose that the Commission, which had said it wanted to see the RCA improvements, would insist upon the condition of bracket standards when that condition had been shown to be impossible.

No amount of argumentation by appellees can read out of the First Report the overriding fact that the Commission said it wanted to see the improvements in the RCA system before adopting an order, and that that was one of the principal reasons it then refused to approve the CBS system.

The Probability of Improvement.

There were strong reasons for the Commission to believe that the improvements in the RCA system had reality.

There was first of all the general, but nonetheless important, reason implicit in the electronics art which created the television industry.

The instinct of the Commission would tell it that an industry which had done these things must be capable of improvements in an electronic color system. Its instinct must have told it that the fact that the RCA system was a

new system, while CBS admitted that its system was fundamentally the same as it had been ten years before (Tr. 3078, 8885-86, 8891-92), was not a point against the RCA system but rather a point in its favor.

As the distinguished scientist and President of Harvard University, James B. Conant, has said:

> "Tremendous spurts in the progress of the various sciences are almost always connected with the development of a *new technique* or the sudden emergence of a new concept."*

In concrete accomplishment, the RCA system had to its credit, among other advantages, two outstanding successes in areas where CBS had tried and failed. One was the development by RCA of a compatible color system (R. 149, 573; Tr. 2658-60, 9495). The other the development by RCA of a tri-color picture tube (Tr. 7989, 7994, 10039-40, 11282; Exhibit 382).**

As goals of research, both of these developments presented difficult engineering problems. Their achievements were scientific accomplishments of first importance to the development of color.

It is compatibility that makes it economically practical for the broadcaster to broadcast in color, his best programs, in choice time.

The RCA tri-color tube is a device upon which all color systems recognize their dependence.

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* CONANT, ON UNDERSTANDING SCIENCE, 73-74 (1947). President Conant is also in point on some of the difficulties with its apparatus which RCA encountered in the early part of the hearing. As he has said:

> ". . . new concepts only develop after an arduous period of experimentation." (*Id.* at p. 36)

** In 1941 CBS told the Commission it had developed a tri-color tube. In 1950 it told the Commission it had failed in its attempt to develop such a tube (FCC Docket No. 5806, p. 2607; Tr. 6539-40).

Even Dr. Goldmark of CBS conceded, on cross-examination that the RCA tri-color tube

> ". . . was an admirable accomplishment." (Tr. (11282)

The majority opinion stated with respect to compatibility:

> "Perhaps the most substantial attack made upon the Commission's order is the adoption of standards which call for an incompatible system which, as admitted by all the parties including the defendants and CBS, is less desirable than a compatible system" (R. 877).

In his dissenting opinion Judge La Buy stated:

> "It is conceded by all and it is self-evident that the best system of color television is a compatible one. . . . Indeed, compatibility is the coveted goal of all engineers and scientists engaged in the television industry" (R. 879).

Appellee CBS likes to claim that its color research has been going on for ten years. If that is so, it is the best proof of the measure of achievement of an electronics laboratory that solves the problem of incompatibility. The President of CBS himself has said:

> "We would love to have compatibility" (Tr. 7177)

But in the ten years CBS talks about, it has failed to find any engineering solution to its problem of incompatibility. RCA, on the other hand, has succeeded in developing a compatible system.

The Commission itself, by virtue of its day-to-day contact with an art which this Court itself has characterized

as so dynamic,* was in an awkward position to deny the potentialities of an electronic system for improvement.

In this case the Commission had had the experience of seeing improvements in the RCA system unfold before its eyes.

In the classic overstatement referred to, the Commission had been told by appellee CBS in October 1949 that "nothing" could improve the RCA system (Tr. 3585). Six months later CBS was to admit that the RCA system had improved "a thousand percent" (Tr. 8882).

In these circumstances the Commission had every reason to doubt the assertions of CBS—now repeated here—that "nothing" can improve the RCA system.**

The Time to Look.

The desire to see improvements expressed by the Commission in the First Report (Par. 148, R. 165-66) was properly a desire to see improvements in the several systems. That Report expressly provided that any such improvements would be shown to the Commission "during the period from December 5, 1950 to January 5, 1951" (R. 169).

These were the very dates on which RCA, in its petition, offered to show improvements (R. 408). And they were selected, as the petition itself indicated, for the obvi-

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* *National Broadcasting Company v. United States*, 319 U. S. 190, 219.

** Appellee CBS had told the Commission in 1944 that the present 525 line standards

> ". . . are simply not good enough to put television over as a real public service or even as a going enterprise." (Tr. 8621-22)

This was said by appellee of the television system that today reaches 45,000,000 people; of the system that appellee now says is proceeding at such a pace that, unless arrested by the device of bracket standards, it will engulf any system that is out of step (incompatible) with it.

ous purpose of meeting the time schedule the majority of the Commission itself prescribed.*

In dealing with improvements, the First Report did not demand that apparatus as demonstrated during the period December 5 to January 5 be fully developed. It was enough that it should at that time show "reasonable prospect" of satisfying the Commission (Par. 154; R. 169). The date of fulfillment of this reasonable prospect was left open in the First Report.

The offer to show improvements in RCA's petition went even beyond the requirements of the First Report. It accepted the dates December 5 to January 5 for the first showing, *and* offered a particular date to meet the reasonable prospect requirement (R. 409).** Thus, the petition offered *more* than the First Report asked.

Nor was it, as appellees imply, vague in respect of what improvements would be shown. It stated specifically that the improvements to be shown would be those which had been "made in the performance of the RCA system, *with particular reference to those points about which the Commission expressed doubts*" in its First Report (R. 409). This incorporation by reference of the points referred to in the Commission's First Report was obviously a convenient and useful device to specify, with particularity, those points that would be covered at the showing.

Appellees are clearly wrong in characterizing the petition as a request that the Commission "postpone decision and some nine months later, start over again" (Appellees' Brief, p. 136). The petition accepted the Commission's own

* The beginning date of the showings was only 15 days beyond that later specified for the order to go into effect. If the Commission thought 15 days was too long to wait, it could of course have granted the petition on condition the date be advanced by some period.

** June 30 of this year.

dates, December 5 to January 5, for a demonstration of improvements made by RCA; and the period to June 30 to view experimental broadcasts under the RCA, CBS, CTI and other systems.

The fact that RCA alone was to show its improvements in the first stage was to provide proof that RCA had actually made improvements of such significance as to justify the second stage. If such improvements failed to materialize, it is clear that the second stage of showings need not come into being, and the only time elapsed would have been perhaps 30 days beyond November 20—the effective date of the order.

Thus, it is wholly inaccurate to characterize this petition as one for delay. It was in fact a petition to implement the Commission's statement in its First Report that

> "... the institution of these proceedings stimulated great activity in the color field and ... since fundamental research cannot be performed on schedule, *it is possible that much of the fruit of this research is only now beginning to emerge.*" (Par. 148, R. 166)

The Refusal to Look.

The denial of RCA's petition to look at these improvements in the RCA system is one of the errors of the Commission principally assigned for setting aside its order. The Commission could not deny this petition without brushing aside its own express desire in the First Report to look at improvements in all color systems.

But in the Second Report that is just what it did. It characterized the improvements in apparatus RCA had offered physically to show to the Commission as nothing but a "paper presentation" (Second Report, Par. 15, R. 419; see Argument for appellees in the District Court, Tr. of Proc. 241).

And the Commission added that the "improvements in systems" did not meet its tests (R. 419-20). This statement was made *without even looking at the improvements* to which it referred.

Appellants submit that this is one of the remarkable utterances in the history of administrative agencies—that improvements which the Commission had said it wanted to see, was petitioned to see, and then refused to see, did not meet its tests.

How did it know?

Appellees argue that there must be a stopping point somewhere in looking at improvements, and that that point is within the particular province of the Commission (Appellees' Brief, p. 139). The short answer is the one already indicated—that the dates selected for the showing of "reasonable prospect" were not appellants' dates; they were the Commission's dates—beginning just 15 days beyond the effective date of the order.*

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* Appellees purport to justify the denial of the October 4 petition on the ground that the public might be injured in having to purchase more expensive externally adapted sets than if it got internally adapted sets. At pages 140 to 142 of their brief, this point is labored at length. The answer is the one given by the majority of the District Court. The entire argument of appellees is based upon the assumption that this Court will necessarily sustain the order. It ignores a contrary possibility (R. 877). If for any reason the order should not be sustained, *then the entire cost to the public of adaptation would be wasted*, since a compatible system involves no such expense whatsoever to the public.

Moreover, the cost figures referred to by appellees are wholly inaccurate and unreliable, as well as obsolete. RCA did not testify, as claimed by appellees, that as a practical matter sets could be internally adapted for only "$7 to $10". Its testimony was precisely to the contrary—that such adaptation is not practical (Tr. 10091). The $7 to $10 basis represents what it would have cost at that time to do an impractical thing had any one been willing to do an impractical thing (Tr. 10091). But RCA expressly testified that as a practical matter it could and would not internally adapt sets on the basis which would require the purchaser of a receiver

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Finally, appellees claim the Commission had no choice but to refuse to look at improvements, in spite of its express desire in the First Report to do so, by reason of the fact that it "would aggravate the problem of incompatibility" (Appellees' Brief, p. 24). The specific remedy for incompatibility was referred to in the preceding point. It is enough here that the added cost to the public of *incompatibility* is one of the principal reasons the Commission should have looked to an improved compatible system.

For incompatibility is nothing more or less than a problem to be solved in the laboratory. It should not be dealt with at the expense of the public by forcing on them the cost of adapters—whether internal adapters or external adapters. The real solution is *no* adapters; and no adapters means a compatible system.

The action of the Commission in refusing to look at improvements in the RCA color system last December was clearly contrary to its first obligation to serve the public interest, and was therefore contrary to law.*

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to jump out of his seat and make adjustments to his set at frequent intervals during an evening's television reception (Tr. 10048-49). This testimony is clearly of record, and the use of figures by appellees in disregard of this testimony renders their whole argument on this aspect of the case both inaccurate and unwarranted. The figures used by appellees are also obsolete by reason of cost increases plus the enactment of an excise tax on television components.

* Appellees' contentions that the Commission properly refused to consider the Condon and Progress Reports as evidentiary material have not been treated again in this Reply Brief because such contentions are clearly untenable.

Appellees have failed to meet the issues presented in Point IV in Appellants' Brief (pp. 115-34), viz. that the Communications Act, the Commission's consistent administrative practice, and the Administrative Procedure Act required the Commission, in a rule making proceeding of this type, to consider the Condon and Progress Reports as evidentiary material.

Appellees have not even mentioned appellants' point that in the setting of standards for AM broadcasting, FM broadcasting, and

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POINT III.

The Action of the Commission in Ruling Out Compatible Color in Competition with Incompatible Color is Unlawful.

The Commission has adopted a system of color television whereby every television transmitting station will *not* serve every receiver within its range (R. 147, 559, 575, 794, 876; Tr. 3411, 4612, 4750-51, 4829, 5134, 6442, 6546, 9962, 10022). By its action the Commission has deviated from its consistent administrative procedure and construction of the Act (R. 559, 563, 608-09).

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the existing television service, the Commission considered and avowedly based its determination upon written data from all sources, along with evidence presented at hearings (Appellants' Brief, p. 117).

Appellees are significantly silent in regard to the point that in their brief in the *National Broadcasting Co.* case the Solicitor General and the Commission told this Court that in the rule making proceeding there involved the Commission had used and had the right to use data not presented at the formal hearings (Appellants' Brief, pp. 125-26).

Appellees attempt to construe Section 4(b) of the Administrative Procedure Act as requiring the Commission to consider "all relevant matter presented" in a rule making proceeding *only* when all the data is submitted in *written* form (Appellees' Brief, p. 132). But Section 4(b) reads that the agency must consider all relevant matter after having allowed parties to submit "written data, views or arguments, *with or without opportunity to present the same orally . . .*"

The statute thus clearly covers a rule making proceeding of this type in which the agency has at its option afforded the opportunity for oral presentation by holding a hearing. The statute is plain that the agency must consider *all* relevant data presented, written and oral, in reaching its decision. Appellees' purported construction of the statute flies in the face of these plain words.

As appellants have stated, the admitted refusal of the Commission to consider such data as evidentiary material (Commission's Brief in the District Court, p. 28; Motion to Affirm by Appellees in this Court, pp. 21, 23) vitiates the Commission's order.

The Commission has for the first time adopted multiple standards for a single service—a broad standard gauge of 525 lines, 60 fields for black and white television and a narrow gauge of 405 lines, 48 color fields for incompatible color television.

At the same time the Commission has refused to allow the broadcasting of RCA compatible color which operates on the broad standard gauge of 525 lines and 60 fields and which is receivable in black and white on all existing sets (Tr. 2658-60; Exhibits 206, 209).

It is conceded that the RCA color system is a fully compatible system—that it can be received in black and white by the 45,000,000 people who now have television service, on 12,000,000 receivers, without any modifications in those receivers whatsoever (R. 147). And no contention was made in the Commission's Reports that the quality of the black and white picture produced by the RCA color system on existing sets was a ground for denying this system to the public.

Moreover, appellees also concede that the RCA color system does not produce any interference by one broadcaster with the signals of another (Appellees' Brief, p. 107).

The clear and uncontradicted fact on the record is that the adoption by the Commission of compatible color television standards would hurt nobody (Tr. 6546).

As the Vice President and Chief Engineer of CBS stated:

> "There is one non-compatible system. . . . There are two compatible systems . . . I couldn't sit here and tell you not to adopt standards of any of those systems because they don't have that device *because nobody would get hurt by it if you do. They are compatible*" (Tr. 6546).

Under these circumstances it is clear:

1. That the Commission did not have the authority to rule out compatible color in competition with incompatible color; and

2. That such prohibition cannot be sustained where there are no administrative findings to support it.

No Authority to Rule Out Compatible Color.

Appellees have failed to meet these issues.

The question here is whether the Commission has the authority, in a competitive industry, to outlaw a system whose transmissions *hurt no one* and are receivable on the 12,000,000 sets in the hands of the public operating on the standard gauge.

Appellees argue that "from the beginning . . . the Commission has established only a single set of standards" for "a radio service" and that this has been "the Commission's own administrative construction [of the Act], followed over a long period of years . . ." (Appellees' Brief, p. 105).

Appellants agree that, until this case, this has been the settled rule of administrative construction under the Act. This is the construction and principle of standardization which appellants have urged upon the Commission in advocating the adoption of a compatible system—one which operates on the standard gauge and is receivable on all television sets operating under the present standards.

It is the Commission which has here deviated from the principle of standardization by prescribing a narrow gauge for color. It is the Commission which has not adopted a single set of standards for the television service.

Having deviated from the principle of standardization, having adopted multiple standards for television, the

question then presented is whether the Commission has the authority to prohibit a broadcaster, who will not interfere with another broadcaster, from operating on the existing standard gauge track.

Appellees rely on Section 303(e) of the Communications Act (which was derived from Section 4(e) of the Radio Act of 1927) as establishing the Commission's power to bar a system which operates on the standard gauge.

Section 303(e) authorizes the Commission to

> "Regulate the kind of apparatus to be used with respect to its external effects and the purity and sharpness of the emissions from each station and from the apparatus therein;"

The legislative history which appellees cite (Appellees' Brief, p. 104) as authorizing the Commission, under Section 303(e), to set standards *does not even relate to appellees' contention.* It contains no mention whatsoever of the setting of standards.

The question asked of Senator Dill, and referred to by appellees, was whether a broadcast licensee could attach a device to his transmitter which would make his transmitted signals *not* receivable on all existing sets and which would require persons desiring to receive these signals to buy a special attachment for their receivers. Senator Dill stated that the Commission could deal with this by revoking the broadcaster's license for a violation of its terms (68 CONG. REC. 3035 (1927)).

The regulatory power to which this legislative history refers is exactly the opposite of that which the Commission has sought to exercise here. The Commission cannot find authority in this legislative history to prohibit the transmission of signals which *are* receivable by every existing receiver without adding any special attachments to the re-

ceiver. It is this assertion of authority that appellants challenge.

Appellants do not now contest the Commission's assumption of power of a decade ago to set standards upon a basis by which every transmitter must serve every receiver in its area. That is the principle of the standard gauge.

Appellants do challenge the Commission's authority to do the converse—to *prohibit* a system of broadcasting under which every transmitter would continue to serve every receiver in its area, a system of broadcasting which operates on the standard gauge, which does not cause interference, and from whose transmissions "nobody would get hurt" (Testimony of appellee CBS, Tr. 6546).

There is no authority in the Act, in the legislative history of the Act or otherwise to support the Commission's denial to the public of the advantages of compatible color transmissions.

Absence of Findings On Competition Between Systems.

Appellees concede that the Commission did not consider or make any findings whatsoever on the possibility of permitting the RCA compatible color system to compete with the CBS system (Appellees' Brief, pp. 111-12).

a. The Issue was Presented to the Commission.

As a belated excuse for the Commission's failure to make such findings, appellees now claim that the issue of competition between color systems was "not really tendered by the parties"* (Appellees' Brief, p. 112). This is not

* In this connection, appellees state that the witnesses were "virtually unanimous" in their opposition to "multiple standards". What appellees have failed to tell this Court is that, with the exception of Stanton of CBS, *the opposition of the witnesses cited by appellees to multiple standards was opposition to the multiple*

(Footnote continued on next page)

in accord with the facts. The position of RCA on this issue was officially presented to the Commission by Brigadier General David Sarnoff, Chairman of the Board of RCA. Only three pages earlier in their brief appellees quote this very testimony.

General Sarnoff recommended that if the Commission should adopt standards for an incompatible system, it should permit also the broadcasting of compatible color (Tr. 10093-95). He urged that the standards set by the Commission be broad enough to permit any color television systems which met the basic requirements of compatibility, definition equal to the present high-quality television standards, and transmission within a 6-megacycle channel (Tr. 10046-47).

In fact, appellee CBS itself, through its vice-president in charge of color television, told the Commission that this issue was before it for determination. Commissioner Hennock questioned Adrian Murphy of CBS on the possibility of allowing RCA compatible color in competition with CBS incompatible color.

Commissioner Hennock inquired,

> "Now can you envision an RCA color set with that new RCA tube in it, and all the other equipment that

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(Footnote continued from preceding page)

standards which would necessarily result from adoption of the incompatible system.

The witnesses—with the exception of Stanton of CBS—urged the principle of standardization within the television service by the adoption of a compatible system. But the Commission disregarded this "virtually unanimous" opposition and by adopting the CBS incompatible system itself prescribed multiple standards for television. The Commission cannot take the testimony of men who favored only a compatible system and cite it as testimony against allowing that same compatible system to compete. Witnesses upon whose testimony appellees rely in their brief (Appellees' Brief, p. 113), did not say that (Baker, Tr. 9685; DuMont, Tr. 5729, 9412, 9413-14; Smith, 8173, 8184-86). In fact, even Goldmark of CBS conceded that "nobody would get hurt" by a compatible system (Tr. 6546).

goes with the RCA color set, and assuming there were a Columbia adapter in that set, and then one of those converters of Mr. Chapin's in that set, would you be able to get both the Columbia color system and the RCA system through that set?

"The Witness: Yes, Miss Hennock, you would.

"Commissioner Hennock: Then what is wrong with that idea?

"The Witness: *That is a fine idea.*

* * * * * *

"I said before that the Commission has a choice of saying there will be one system or there will be two or more systems." (Tr. 6248-49).

Appellees are simply mistaken in stating that the issue of allowing compatible color to compete was never posed to the Commission. The issue was posed squarely and the Commission was therefore obligated to make findings on this point.

b. The Commission Made No Findings on The Issue Presented.

Appellees have conceded (Appellees' Brief, pp. 111-12) what is self-evident from the First and Second Reports, that the Commission made no finding that the broadcast of compatible color in competition with incompatible color would not be in the public interest. Appellees have conceded that the Commission did not consider whether there was any middle ground between the exclusive adoption of an incompatible system and the exclusive adoption of a compatible system. Appellees have admitted that the Commission "never reached the question" (Appellees' Brief, p. 112) of considering the possibility or advisability of permitting the broadcasting of compatible color together with the broadcasting of incompatible color.

Appellees evade the legal issues raised by the Commission's complete failure to consider the question of permitting the RCA compatible system to compete with the CBS incompatible system. Appellants' main brief establishes that:

1. The Commission did not see fit to disclose the factors prompting its action in ruling out competition. It achieved that result on *unexpressed and unexplored assumptions* which mold for years to come the industrial, social, and technical patterns of a most dynamic and important medium of mass communication.

Under *Jacob Siegel Co.* v. *Federal Trade Commission*, 327 U. S. 608, such failure to treat the question requires a reversal of the District Court's judgment (Appellants' Brief, pp. 104-05).

2. The Commission made no findings in support of its conclusion *sub silentio* on competition. There is not a single finding which establishes either the Commission's jurisdiction or reasonableness in ruling out compatible color broadcasts. Such lack of findings requires a reversal of the District Court's judgment under a long and unbroken series of decisions by this Court (Appellants' Brief, p. 112).

3. Counsel may not substitute inference and argument for administrative findings. Otherwise, the findings rule could be so easily evaded as to be of no meaning. *Securities and Exchange Commission* v. *Chenery Corp.*, 318 U. S. 80, 92. Indeed, this very Commission has been told by this Court that an inference may not replace a finding. *Ashbacker Radio Corp.* v. *Federal Communications Commission*, 326 U. S. 327, 333. See also *United States* v. *Baltimore & Ohio R. R.*, 293 U. S. 454, 463-64; *Florida* v. *United States*, 282 U. S. 194, 215.

c. Purported Justification.

Appellees' argument rests entirely on one premise—the Commission's findings in respect of the RCA system. This premise, appellants submit, is unsound for the following reasons:

First, the Commission's findings on the RCA system, *even if assumed to be valid*, have no application to the issue of competition. They are directed solely to the question of whether the RCA system should be *exclusively* adopted. Such findings are totally different from the findings which would be necessary to serve as the basis for a conclusion that a compatible color system should not even be permitted to compete.

The criteria and evaluation of a system looking to its establishment on a competitive basis are entirely different from the criteria on which a system is evaluated for adoption on an exclusive basis.

Only if the Commission had expressly considered a color system from the point of view of establishing it on a competitive basis and had adopted criteria looking to an evaluation of a system on a competitive basis, could it determine that it was unsatisfactory as a competitive system.

The fact that the Commission may have found a system unsatisfactory when judged by criteria for an exclusive system has no relevance as to whether the same system would be satisfactory if judged on a competitive basis.

Moreover, the need for such findings was particularly in order in view of the admitted compatibility of the RCA system. The Commission had before it a system which met the basic criteria laid down by the Commission in the notice which convened the hearing. In the view of CBS' own Vice President, this meant that "nobody would get hurt" by adoption of the RCA system. If "nobody would get hurt"

by the broadcasting of a system which meets basic criteria, the Commission was obviously required to justify its complete prohibition of such broadcasting by specific findings.

With a compatible system before it, the Commission could exclude it from the area of competition only if it could make findings as to its performance which would outweigh the fundamental fact, conceded by appellee CBS, that "nobody would get hurt" by its use.

There are no such findings in the Commission's Reports.

The application of the *Siegel* case is therefore clear. Having made *some* findings, the Commission drew conclusions from them. But, in the language of the *Siegel* case, "the Commission seems not to have considered" the issue of competing systems. There is "no indication that the Commission considered the possibility of such an accommodation." The Commission's "expert opinion is entitled to great weight in the reviewing courts. But the courts are not ready to pass on the question whether the limits of discretion have been exceeded in the choice of the remedy until the administrative determination is first made" (327 U. S. at pp. 613-14).

Appellees seek to discredit the *Siegel* case in two ways: by distinction and by citing a case from the Court of Appeals of the District of Columbia.

The attempt to distinguish the *Siegel* case rests on an argument that, in effect, the *Siegel* rule does not come into play if the findings which are made can support an alternative but unexpressed conclusion (Appellees' Brief, p. 112, n. 128).

There are two answers to this: (a) The *Siegel* case stands for exactly the opposite rule—the case is a direct holding that *express* consideration must be given to possible alternatives; (b) as we have shown, the findings here do *not* support the conclusion because they are incom-

plete. Findings concerning use of the RCA system on an exclusive basis are of no relevance in establishing that the RCA system should be ruled out on a competitive basis.

The *Simmons* case, cited by appellees *, does not hold otherwise; indeed, the facts there only point up the defect in the Commission's action here.

There the court was concerned with *mutually exclusive* license applications and ruled that one, once denied, did not merit later comparison with the other. The case serves to emphasize the very point which the Commission seems to have forgotten and which appellees avoid. The very issue to be decided here was whether an incompatible system *should* be adopted exclusively. It was a live, open issue before the Commission. But the Commission ruled *as if* it were dealing with already mutually exclusive applications.

Finally, appellees neglect entirely the fact that the Commission made no findings which can serve as a foundation for the *exercise of jurisdiction* in ruling out the RCA color system in competition with the CBS system.

Five cases** are cited in appellants main brief (p. 112) which hold flatly that an administrative order cannot stand when "quasi-jurisdictional" findings are lacking. Nowhere does appellees' brief address itself to these cases. Instead, that brief attempts to substitute arguments for these missing quasi-jurisdictional findings—an attempt which, we have shown, will not be countenanced by this Court. Not that appellees consider the issue minor or

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* *Simmons* v. *Federal Communications Commission*, 145 F. 2d 578 (D. C. Cir.); 169 F. 2d 670 (D. C. Cir.), *cert. denied*, 335 U. S. 846 (Appellees' Brief, p. 112, n. 128).

** *Thomas Paper Stock Co.* v. *Porter*, 328 U. S. 50, 53; *Yonkers* v. *United States*, 320 U. S. 685, 691-92; *United States* v. *Chicago, M., St. P. & P. R. R.*, 294 U. S. 499, 510-11; *United States* v. *Baltimore & Ohio R. R.*, 293 U. S. 454, 463-65; *Panama Refining Co.* v. *Ryan*, 293 U. S. 388, 431-33.

easy. They find it necessary to devote over ten pages of their brief (pp. 101-111) to arguments that the Commission could properly exercise power in this area. Their recognition of the importance of the question comes too late; it was the Commission's duty to lay bare, at the time it issued the Reports, what it considered to be the sources of the authority it exercised in ruling out competition.

Arguments of Counsel Against Competition.

Although arguments of counsel cannot be a substitute for administrative findings, appellees have put forth various arguments as to why the competition of compatible color was prohibited. They contend that the establishment of a single standard is consistent with the Commission's statutory duty to foster competition (Appellees' Brief, pp. 108-11).

As stated, the entire premise of this point is erroneous since the Commission did not adopt a single standard for television. It adopted multiple standards—a broad standard gauge for black and white and a narrow gauge for color. The Commission itself adopted a policy of competition between systems in the television service.

In its Second Report the Commission recognized this explicitly by saying

> "if both types of receivers are offered to the public, it will be the *free forces of competition* which govern whether a customer will buy a color receiver or a black and white receiver" (R. 418).

In view of the Commission's action in adopting, by the very order under review, a policy of competition between systems, appellees' later statement that the type of competition intended by the Communications Act is not between "means of signal transmissions but rather the competition

between licensees'' (Appellees' Brief, p. 110) becomes meaningless.

If competition under the Act was intended only to be between licensees and not between standards, then the Commission had no right to adopt an incompatible system and was obligated to adopt a compatible system, which runs on the standard gauge track.

Appellees argue, although the Commission has not so found, that it must be concerned lest the public waste its money on inferior sets (Appellees' Brief, p. 111).

This argument assumes that the fundamental law of the American economy—competition—is inapplicable to the field of broadcasting. No basis whatsoever is cited for such a sharp break with fundamental concepts of law.

Moreover, the argument assumes that set manufacturers have nothing to risk in selling inferior products. Those who manufacture television sets are fully aware of the importance of consumer good-will. It is precisely here that the Commission's assumption has no relation to the facts of life. A television set is not a bottle full of a mysterious patent medicine with a fancy label which proclaims that it contains the elixir of life. It is rather a standard article of commerce the worth of which the consumer judges *before he purchases it.*

45,000,000 people have television service today. They have purchased 12,000,000 sets. That is the measure of their experience in this area. It cannot reasonably be assumed that the public would buy an inferior product if it is permitted to watch, side by side in showrooms, color sets operating on two different systems. The acid test of comparison in the arena of free public choice is sought by set manufacturers here. It is only the Commission's action and the resistance by appellee CBS to competition that prevents it.

Appellees further argue that the Commission was justified in refusing to allow the competition of compatible color lest "licensees . . . drain their resources in complex and inoperable equipment" necessary to transmit compatible color (Appellees' Brief, p. 106).

This is a novel concept as to the type of competition appropriate for the broadcasting industry. It is not competition—it is the very antithesis of competition. Appellees are advocating that the Commission rather than competition shall decide what broadcasters and listeners may buy.

This position is in strange contrast to that previously taken by the Commission and the Solicitor General in their brief in this Court in *Federal Communications Commission* v. *Sanders Brothers Radio Station*, 309 U. S. 470. In that brief the government contrasted the statutory scheme which the Congress has provided for the railroads, where

> "there has been a substitution of governmental regulation for competition as a means of protecting the public" (p. 23)

with that for the broadcasting industry where no such scheme of governmental regulation is provided in the Act. On the contrary the Commission there stated that the Communications Act contemplates that, in the field of broadcasting, the protection of the public

> "must be found in the effects of competition". (p. 25)

Appellees argue further in attempting to justify the Commission's refusal to allow competition from compatible color that the RCA system has "excessive susceptibility" to interference from oscillator radiation and that, because of such interference, adoption of the RCA system "would more certainly require" a rearrangement

of channel allocations. (Appellees' Brief, pp. 106-07) This argument not only lacks support but is contrary to the facts. As Chairman Coy noted on the record (Tr. 6264):

> "In connection with this problem of oscillator radiation, it is not peculiar to color television systems or color television receivers. It is a problem we likewise have with us in black and white today. . ."

Other engineering testimony bears out the fact that the problem is common to both color and monochrome (Tr. 10692).

Counsel for the Commission in oral argument before the District Court termed such susceptibility a relatively minor matter (Tr. of Proc. 226). And CBS testified that such interference was of "secondary importance" (Tr. 9175). Appellees, in a search for some argumentative justification for prohibiting the RCA system in competition with the CBS system have suddenly decided, without any justification, that such interference was "excessive".

The argument that "a major method of minimizing such interference would be to rearrange the channels which can be assigned to the communities" is in flat contradiction to the engineering testimony in the record and to the positions taken by the Commission's engineer Chapin, and by Chairman Coy.

There is overwhelming testimony that the solution of the problem of interference due to oscillator radiation is a straightforward engineering matter of receiver design* (Tr. 10692-94, 10715-16).

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* RCA is on record with the Commission, through a letter of its President, that the problem should be dealt with as a matter of receiver design. RCA has already taken substantial steps to achieve this (Tr. 10715-16).

Chapin himself testified,

> "I prefer the approach [to solving oscillator radiation] by receiver design as the first thing to try to get around this difficulty . . ." (Tr. 10655).

When a witness suggested the possibility that one way to eliminate such interference would be to alter the channel allocations, Chairman Coy rejected that suggestion and concluded that it was a matter of receiver design (Tr. 8260-61).

Arguments of Counsel Are No Substitute For Findings.

The contentions advanced by appellees in their brief in support of the Commission's action prohibiting compatible color from competing with incompatible color are mere arguments of counsel. They are no substitute for the administrative findings which this Court requires.

The Commission made no finding, nor could a finding be sustained, that it had power to prohibit competition from a compatible color system which operates on the standard gauge and which can be received in black and white on all existing television receivers.

The Commission made no finding, nor could a finding be supported by the record, that the public and the broadcaster require protection from competition between compatible and incompatible color.

The Commission made no finding, nor could a finding be supported by the record, that allowing the RCA system to compete on the standard gauge would affect the allocation of channels.

Lack of proper administrative findings is an issue not new to this Court. It should also not have been new to this Commission. A far reaching regulation vitally affecting the public and an important industry has been imposed with-

out avowed reason. A middle ground in color television has not been considered. The public and the industry deserve better at the hands of a body charged with responsibility in an area of such significance.

POINT IV.

Reply to Argument that Substantial Evidence Is Not Necessary.

Appellees have always been reluctant to measure the findings and order of the Commission against objective and ascertainable facts. But they have never before argued that they do not need to satisfy the test of a review of the record for substantial supporting evidence. In this Court for the first time they suggest a standard of review which would uphold the order even if there is no substantial evidence in its favor. They say the order can only be overturned if "it bears no reasonable relation—in fact or as a policy matter—to the statutory duty of the Commission . . . and the statutory objective;" it is invalid, they say, only if it is not an alternative which "a rational person could have chosen" (Appellees' Brief, pp. 40-41).

But it is not and never has been the law that administrative actions of whatever kind are valid unless palpably irrational. Such a theory would make judicial review a mere formality. The pre-Administrative Procedure Act cases which appellees cite do not support any such extreme position—the case of *National Broadcasting Company* v. *United States*, for example, expressly held that the findings must be supported by evidence (319 U. S. 190, 224).

Since those cases, moreover, the Administrative Procedure Act has been passed, and the Commission must operate within its limits. 60 Stat. 237, 5 U. S. C. §1001 *et seq.*

That Act was designed, as this Court has recently said, to assure a *wider* scope of judicial review than had been afforded by the previous practice. *Universal Camera Corp.* v. *National Labor Relations Board*, ... U. S. ....., 71 Sup. Ct. 456; *National Labor Relations Board* v. *The Pittsburgh Steamship Co.*, ... U. S. ....., 71 Sup. Ct. 453.

Appellees argue, however, that even the Administrative Procedure Act does not make the requirement that the record must contain substantial supporting evidence applicable to this proceeding. This extraordinary argument misconstrues the language of the statute in a manner that would defeat the Congressional intent.

Appellees of course are insistent that review be on the record; indeed, they would confine all attention to the transcript of testimony before the Commission, and exhibits introduced while testimony was being taken. Everything else, they argue, must be ignored. They are not even willing to consider data submitted, after the testimonial hearing had been closed, in response to an express Commission request for data.

Appellees take the position, as they must to be consistent with this argument, that neither §10(e)(5) nor §10(e)(6) of the Administrative Procedure Act is applicable to this proceeding. Section 10(e)(6) they dismiss casually on the ground that it applies only when there is a trial *de novo*, which they of course consider out of the question here. Section 10(e)(5) they consider inapplicable on the ground that the hearing, whose record they rely on before this Court, was not required by statute.

But if anything is clear from the legislative history of this portion of the Administrative Procedure Act, it is that Congress intended all judicially reviewable administrative action to be subject to the requirements of either §10(e)(5)

or §10(e)(6). Between them, these two categories were intended to cover the entire field. The pertinent provisions of §10(e) are:

> "... the reviewing court shall ... hold unlawful and set aside agency action, findings, and conclusions found to be ...
>
> "(5) unsupported by substantial evidence in any case subject to the requirements of sections 1006 and 1007 of this title or otherwise reviewed on the record of an agency hearing provided by statute; or
>
> "(6) unwarranted by the facts to the extent that the facts are subject to trial *de novo* by the reviewing court."

The Senate Judiciary Committee explained that

> " ... the sixth category ... would permit trial *de novo* to establish the relevant facts as to the applicability of *any* rule ... where there is no statutory administrative hearing." *Legislative History of the Administrative Procedure Act*, SEN. DOC. No. 248, 79th Cong., 2d Sess., pp. 39-40.

The draft thus commented on was prior to the addition of the latter part of §10(e)(5). This latter addition was intended to make it clear that the two clauses together covered all situations. After this change, the House Judiciary Committee reported as to these two clauses:

> "In short, where a rule or order is not required by statute to be made after opportunity for agency hearing and to be reviewed solely upon the record thereof, the facts pertinent to any relevant question of law must be tried and determined *de novo* by the reviewing court respecting either the validity or application of such rule or order—because facts

> necessary to the determination of any relevant question of law must be determined of record somewhere and, if Congress has not provided that an agency shall do so, then the record must be made in court." (*Id.* at pp. 279-80)

The language of §10(e)(5) was therefore intended to cover all situations not requiring a trial *de novo*. It does in fact cover such situations, although the somewhat complex scheme of the statute does not make this immediately apparent. To understand the scope of subsection 5 it must first be realized that the requirements of §§7 and 8 apply to all hearings *required* by statute. This is made clear by §§4 and 5 which expressly so state. Thus if this simple substitution without change of meaning is made in the language, subsection 5 renders the substantial evidence rule applicable

> ". . . in any case [in which an agency hearing is *required* by statute] or otherwise reviewed on the record of an agency hearing *provided* by statute."

This substitution makes it plain that the phrase "provided by statute" covers something more than the phrase "required by statute."

In *Wong Yang Sung* v. *McGrath*, 339 U. S. 33, this Court held that the phrase "required by statute" covered all hearings held by compulsion, and omitted "only those hearings which administrative agencies may hold by regulation, rule, custom, or special dispensation" (p. 50). The latter are the hearings which are specifically intended to be covered by the phrase "provided by statute." The difference in language can lead only to a difference in result.

It must be reemphasized that to carry out the Congressional intent, if the substantial evidence rule is not ap-

plicable in the present case, then the order of the Commission must be reviewed under §10(e)(6) of the Administrative Procedure Act, and there must be a trial *de novo* in the District Court to determine whether the order is or is not "unwarranted by the facts". In either case, the decision here appealed from cannot be sustained.

The point is that a review must be either "on the record" or not on the record; either the parties are permitted to prove error by introducing new evidence before the court, or they are not. If they are not, if the review is "on the record," the record is insufficient if it does not contain substantial evidence in support of findings and order.

Appellees cannot have it both ways.

POINT V.

Reply to Argument that the Commission's Record Is Adequate and Its Action Supported by Substantial Evidence.

Admitted Inadequacy of Administrative Record.

Appellees endeavor by sheer number of references to the transcript of the hearings before the Commission to obscure the fact that the Commission's record is admittedly inadequate. No attempt is made by appellees to differentiate between outmoded and superseded evidence on the one hand and current evidence on the other, in spite of the statement of the majority of the District Court:

> "It is pertinently pointed out . . . that a number of critical findings [of the Commission] are based upon evidence which was taken in the earlier stage of the proceeding *which is not representative of the situation as it existed at the time the findings were adopted*" (R. 871).

Appellees do not have a satisfactory answer to the fact that in its First Report of September 1, 1950 the Commission itself held that the record before it considered in its entirety did not warrant final action. The Commission then conceded, as set forth in appellants' main brief (pp. 54-58), that the adoption of the CBS system without hearing further evidence would mean that the Commission was

> "compelled to *speculate* as to *an important basis for its decision . . .*"

and that

> "the Commission's determination on *an important part of its decision* would be based on *speculation and hope . . .*" (R. 165),

Clearly, "*an important basis* for its decision" and "*an important part* of its decision" mean just that, and not an insignificant or inconsequential part. Furthermore, "*speculation and hope*" mean speculation and hope and not substantial evidence.

The ultimate rationale of the Commission's decision is set forth by appellees in their brief. It is there stated (p. 24):

> "The Commission stated . . . that despite the advantages of postponing adoption of standards for the CBS color system in order to await the outcome of further developments or testing . . ., there was an important counter-balancing disadvantage. This disadvantage arose from the fact of the incompatibility of the CBS system."

In other words, appellees concede that the reason for the adoption of the CBS system at this time is a major and all pervading defect of that system.

Lack of Substantial Evidence to Support the Commission's Findings.

The extremes to which appellees find it necessary to go in endeavoring to meet appellants' attack on the substantiality of the Commission's findings (Appellants' Brief, pp. 52-97) are highlighted by their statement that appellants have not set out the Commission's findings in full but "have paraphrased them" (Appellees' Brief, p. 53).

This comes with poor grace from appellees since the so-called "basic findings" with respect to the CBS system and the RCA system were prepared by appellee CBS and were set forth in the CBS Memorandum filed with the court below. The court below in its opinion relied upon CBS at least to the extent of listing these basic findings (R. 868-70) which appellees, including CBS, now criticize.

Appellees do not and could not refute the validity of the evidence which appellants refer to in their brief as showing the lack of support for the Commission's findings (Appellants' Brief, pp. 52-97). They endeavor to minimize its weight and importance by stating that such evidence merely shows that there would have been support for the Commission to have reached a contrary conclusion. Such evidence, however, goes further than that. A review of the record as a whole shows that that evidence is the evidence which is current and of controlling importance.

In the first part of their brief, appellees have set forth a summary of the Commission's findings in its First Report and have attempted to show that these findings are supported by substantial evidence.

There is no question but what the appellees' citations are substantial *in number*. Appellants submit however that analysis of them shows that on the basis of review of the record as a whole there is not substantial evidence supporting the Commission's findings.

1. The CBS Color System.

a. Convertibility.

The Commission's finding that existing black and white receivers can be converted to receive CBS transmissions in color is in flat conflict with the evidence showing that CBS disc converters, upon which this finding is based, are hopelessly impractical.

The record shows that the only converters demonstrated by CBS require that the image size be *reduced* to that produced by a 7-inch tube in order for the converter to operate (Tr. 3246-47, 3448, 3597, 3617, 6549, 8989, 8999-9000, 9135).

Thus, in order to convert their receivers with disc apparatus, owners of 10-inch, 12-inch and 16-inch and larger receivers would have to be willing to accept a much smaller picture than they got when they bought their receivers.

There is no evidence in the record other than unsupported hope to show that these converters would meet with any degree of public acceptance. (See Tr. 9023)

There is the additional problem of mounting, which is made most acute by the requirement that the color disc must be at least twice as large as the diameter of the image to be covered and the fact that the receivers in the hands of the public are of an almost infinite variety of cabinet designs (R. 150, 602; Tr. 3217).

Throughout the hearing, CBS endeavored to give the impression that the Commission should consider conversion only in connection with table models of small picture size and of simple cabinet design. Efforts to bring out the fact that serious mounting problems are encountered on console and consolette receivers have drawn a charge from CBS of irrelevancy. However, there are many large tube receivers in the hands of the public—in fact, from the figures in the record, the inference is required that by far the great

majority of receivers in the hands of the public have tubes which are of such a size as to require image reduction in order to permit conversion with disc apparatus. In addition, only about 60% of the receivers produced during the period from the end of the war through February, 1950 were table model receivers (Exhibit 385).

The response of a CBS witness to questioning as to how conversion of the various models of television receivers shown in Exhibit 400 could be converted is significant in considering how much weight can be given to a finding of "convertibility" based on mechanical disc-type converters.

This testimony was that the proper way to mount a CBS converter on any console or consolette receiver was to mount the converter on a pedestal similar to a microphone stand and put the microphone pedestal, with the converter on top, in front of the receiver. Although the witness gave consideration to the possibility of using "a set of straps over the top of the set" he concluded that the microphone pedestal would be more feasible and "We would handle practically all of these [console and consolette receivers] that way" (Tr. 9154-55).

Although the witness at first did not think it would ever be necessary to move this pedestal-mounted converter, later he conceded that it would be desirable to attach wheels to the microphone pedestal so that standard black and white pictures could be viewed and the full usefulness of the original set preserved (Tr. 9155-56).

The cost of these spinning mechanical converters is another serious deterrent to conversion. The weighted average of the cost of disc-type conversion contained in the estimates submitted by members of the Radio-Television Manufacturers' Association was $250 (Exhibit 204). In addition some of the member companies stated that they considered disc-type conversion so impractical that cost esti-

mates were not submitted. These companies included Admiral, Magnavox and Stromberg-Carlson. Although Philco, DuMont and RCA submitted cost estimates of disc-type conversion, they expressly stated that they did not consider such conversion to be practical. (Exhibit 204; Tr. 2666-67, 2671, 4864, 9962).

The estimates of cost of disc-type conversion by the witnesses who testified on behalf of CBS were lower, ranging between $55 and $80 for the cost of a 7-inch (magnified to 10-inch) disc converter (Tr. 3592, 3687). To this would have to be added the cost of scanning adaptation, which, according to the estimates given by the witnesses called on behalf of CBS, would range from $20 to $50 (Tr. 3515, 3687, 3635-38). Thus the cost of converting, using even the lowest estimates, would range from $75 to $130.

In April, Mr. Gross, the President of Teletone, testified on behalf of CBS that his 10 inch monochrome set was selling then for about $130 (Tr. 9099).

It is clear that, *based on the testimony of CBS' own witnesses, the cost of conversion is in the neighborhood of 100% of the cost of a new black and white set.*

The Notice of the Commission upon which the color hearings were based specified that any color system would be considered for adoption only if its transmissions could be received "simply by making relatively minor modifications in such existing receivers" (R. 26). To characterize a change which requires the expenditure of an amount equal to the purchase price of a new set as "relatively minor", as the Commission did in its Second Report (R. 417), transgresses the bounds of reason.

b. Adaptability: Quality of Black and White Picture From Color.

Throughout their brief appellees have tried to establish that adaptation of existing receivers to receive CBS color

in black and white was inexpensive and easy. Even if it were possible to adapt the 12,000,000 receivers in the hands of the public to receive CBS color (as degraded black and white pictures), doing so would be neither inexpensive nor easy (R. 147-48, 575, 602, 794, 876; Tr. 4830, 5538-41, 6858, 8187).

In order that existing receivers may receive CBS color in black and white, the principal change required is that the scanning circuits of the receiver be changed from a scanning speed of 15,750 lines per second to a scanning speed of 29,160 lines per second (Tr. 3971). This requires an important change in the essential operating elements of the receiver.

What this means in terms of practicalities of actual change-over is illustrated by the DuMont experience before the war. Prior to World War II, there were about 1,000 DuMont television receivers in the hands of the public. When the Commission authorized a change in the channel allocations, DuMont found it necessary to bring the receivers which it had sold back to the factory in order to make the required changes in the tuning range of the radio frequency selector circuits. Again, when the scanning standards were changed from 441 lines 60 fields to 525 lines 60 fields—a net increase of only 2,520 lines per second as against a net increase of 13,410 lines per second under the Commission's order—DuMont found it necessary to bring its receivers back to the factory for the necessary conversion. As stated by Dr. Goldsmith:

> "The reason we adopted the policy of bringing those sets back to the factory for conversion rather than sending a service man to convert them in the customer's home was that we found that initial tests of that sort had very sad results" (Tr. 5277).

It was on the basis of DuMont's experience, and not on the basis of *a priori* reasoning of the kind forthcoming from CBS witnesses, that Dr. Goldsmith of the DuMont company testified that the changes required in existing receivers to enable them to receive CBS color in black and white are

> ". . . far beyond the practical realm of what a service man can do in a living room" (Tr. 5106).

The heavy burden of cost which would be imposed upon the public by external adaptation, as proposed by CBS, is shown by CBS' own witnesses. These estimates for external adapters range from $32 to $50 (Tr. 3513-14, 3687). No allowance was made for the service charge of installation except the plainly ridiculous estimate of $2.00 to $2.50 made by one witness (Tr. 3637).

Even disregarding the service charge factor, the cost of adapting the more than 12 million receivers now in the hands of the public on the basis of these CBS figures would be on the order of $384,000,000 to $600,000,000.*

Nor is this the only price the public would have to pay merely to continue to receive their present black and white

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* Furthermore, there is no sound basis for assuming that the cost of adaptation would be this low. The Philco and DuMont estimates of $75-$125 were dismissed by the Commission and not even taken into account (R. 148). The DuMont and Philco testimony regarding this matter shows that the reason their estimates were higher than others was their desire to protect their good will and avoid, so far as possible, degrading the performance of their sets now in the hands of the public.

Nor does the FCC Laboratory Division's report with respect to adaptation (Exhibit 390) warrant the inference that the cost to the public of adaptation to receive CBS color in black and white will be low. No provision in those estimates was made for labor costs, costs of installation, or allowance for overhead and profit (Tr. 10652). Furthermore, the labor cost involved in using engineers of the same ability and background to adapt receivers generally precludes any comparison between what was done there and what could be expected from an ordinary serviceman.

service, if the order is allowed to stand. They would also have to accept a 60 per cent reduction in picture detail.*

This 60 per cent degradation of receiver performance is inherent in the quality of the transmissions provided for by the Commission's order. No matter how good the adaptation may be, this degradation is inevitable. Performance may be even further degraded, however, if the adaptation is not skillfully performed.

The required adaptation of existing receivers was found by the Commission to be a "relatively minor modification". Such a finding cannot be said to be rational in the light of the facts given.

c. Equipment Considerations.

The Commission's findings with respect to CBS receivers and the citations to the transcript made by appellees relate to CBS mechanical spinning disc receivers. The uncontradicted evidence is that the mechanical disc receivers are inherently limited in picture size, brightness and are susceptible to flicker and color break-up. Even CBS concedes that the elimination of these undesirable characteristics can only be achieved with all-electronic receivers (see Tr. 3110, 3169, 3217, 3237-8, 9196-98, 9572).

What the Commission has done therefore is to adopt an incompatible low-definition system because of some imaginary advantages in that system's use of mechanical receivers which even CBS concedes have reached maximum performance and picture size.

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* What appellees term "firm support in the record" for the Commission's conclusion that this degraded black and white picture will be acceptable, is based upon certain public reaction tests conducted by CBS. It was during these same surveys that CBS, while demonstrating its color, showed the public participants in the survey black and white pictures from CBS color transmissions *without telling the public that they were being shown a degraded black and white picture* (Tr. 6363, 6368). This was continued until *CBS counsel himself had the practice stopped* (Tr. 6368).

This in the face of a record which discloses that disc receivers will not be satisfactory for use in the home under normal television broadcasting conditions (see cross-examination of Stanton, Tr. 8659-71; see also Tr. 9349-54).

Appellees endeavor to support the action of the Commission in standardizing on a system of color television in which, on the basis of the mechanical disc receivers proposed and demonstrated, the direct-view picture size would be limited to 12½ inches. Appellees state that "a public reaction survey showed an overwhelming preference for 12½ inch color pictures to 16 inch black and white pictures" (p. 87). Similar support for the Commission's action was claimed at other points in appellees' brief (pp. 29, 83).

The impropriety of appellees' reliance on the survey is shown by the report of the survey itself. With reference to the question upon the answers to which appellees rely, the "Instructions for Interviewers", as set forth in the report, stated (Exhibit 332):

> "The essence of this question is the comparison of the critical feature of color *rather than size of the picture.*"

The Commission's findings with respect to the cost of CBS disc-type receivers are virtually meaningless since they relate to receivers of tube size for which there is no public demand today. For example, the Commission's findings relate to a 7 inch receiver. Even at the time of the hearing, a 10 inch receiver was the smallest for which there was any substantial market (see Exhibits 386, 450). The minimum for which there is now any substantial market is a 16 inch receiver (R. 602).

The only cost estimate for a CBS disc-type receiver of a size which may find public acceptance today was the DuMont estimate of $500 to $600 for a 12½ inch receiver (Tr. 9391-92).

The importance of this is shown by Dr. DuMont's testimony that the cost of color receivers for the RCA and CBS systems was approximately equal, with the possible edge in favor of RCA (Tr. 9391-92).

Mr. Smith of Philco testified that he had "a very strong conviction that the cheapest way . . . to build a color receiver is to use a direct view type of color tube" and an all-electronic color system like the RCA system (Tr. 8201).

The finding that the camera used with the CBS system can be used out-of-doors rests upon one short demonstration in October, 1949; appellees, in their brief (p. 22), have stated that CBS station equipment is simple to handle and has been subjected to use in *"widely diversified circumstances"* without difficulty.

Dr. DuMont, on the contrary, testified:

> ". . . I actually have not been able to sell myself that it could handle normal commercial programs." (Tr. 9393)
>
> • • • • • •
>
> ". . . you cannot make a determination from just one demonstration of 10, 15 minutes, I don't believe; and I have purposely looked at the demonstrations whenever I could in New York, and it is the same Patty Painter with the fans, since 1946; I keep seeing the same thing" (Tr. 9545).

d. Flicker and Brightness.

The Commission's findings with respect to flicker and brightness in the RCA and in the CBS systems respectively are characteristic of the Commission's approach to the RCA system.

The finding for CBS is that the maximum brightness of 22 foot lamberts achieved by CBS disc receivers is

> "entirely adequate for use in the home under normal viewing conditions" (R. 136).

The finding for RCA is that the brightness of RCA color receivers was not sufficient for ordinary home use (R. 137). This finding was made a month *after* the Commission had been informed that the RCA tri-color tube receivers had achieved brightness of more than 20 foot lamberts and the Commission had been invited to see this for itself (R. 400).

No reference is made by appellees to the testimony of Mr. Fink, Dr. Goldsmith, and Dr. DuMont in connection with the finding that CBS receiver brightness can be increased by use of tubes with long persistence phosphors. This testimony shows that the tendency of long persistence phosphors to "smear" imposes severe limitations upon the use of such phosphors and may make their use for commercial home receivers for the CBS system impossible (Tr. 7989-90, 9499, 9942-45).

Appellees contend that the public reaction surveys submitted by CBS show that the CBS mechanical disc receivers were adequately bright, or perhaps even a little too bright, although the highlight brightness of its receivers did not exceed 25 footlamberts (Appellees' Brief, pp. 75-76; Tr. 6738-39).

As was brought out in the examination of the CBS employee who testified regarding these surveys and in the testimony of a member of the Commission's staff, the question regarding brightness put by CBS to those members of the public who participated could easily have been misunderstood. One who found the colors too vivid might well have answered that the picture was too bright, even though he did not find that the screen illumination was excessive or even adequate (Tr. 6746-48, 6829-30).

The record shows that a more valid response would have been obtained by allowing a choice of pictures of different highlight brightness (Tr. 6849). This was the procedure followed in the experiments conducted by the technical com-

mittee of which the present Chief Engineer of the Commission was a member.

On the basis of a side-by-side comparison, those experiments resulted in a choice of brightness between 30 footlamberts and 1400 footlamberts, with preferred values near the maximum (Docket 7896, pp. 418-19, 431-32; Exhibit 21, pp. 127-146).

These findings in respect of brightness by a committee of experts which included Mr. Plummer, now Chief Engineer of the Commission, are so sharply at variance with the Commission's conclusion in respect of "adequate" brightness for the public as to show in still another respect the unreasonableness of the Commission's order.

e. Registration—Color Break-Up and Fringing.

Color fringing and break-up are inherent in the CBS disc type apparatus (Exhibit 210). CBS claims and the Commission found that use of disc type mechanical apparatus minimized registration problems. But what the Commission's findings failed to point out is something admitted by CBS—that the use of disc type apparatus results in trading registration problems for color fringing and color break-up.

As stated by Dr. Goldmark of CBS:

> "... But we concede that you can see color fringing on the pattern." (Tr. 9596)

Appellees rely extensively, to support the findings which the Commission made, upon surveys conducted by CBS. In one such survey 33 people replied:

> "Color break-up [was] annoying, particularly when viewer moves eyes, rainbow effect, flashes of color." (Exhibit 332, p. 31)

The significance of this is indicated by the fact that in the same survey and in answer to the same question calling for general comments, only 8 commented favorably on the quality of CBS color (Exhibit 332).

2. The RCA Color System.

a. Flicker.

Dr. DuMont is cited by appellees in support of the finding by the Commission that the flicker characteristics of the RCA system are doubtful (Appellees' Brief, p. 8).

Dr. DuMont testified:

> "I don't think there is any problem on flicker [in the RCA system] whatever." (Tr. 9379)

b. Brightness.

Reference is made to the finding that

> "there is doubt . . . whether there is not a fundamental limitation . . . on its [the RCA] brightness potential." (Appellees' Brief, p. 9)

Although there is citation of the testimony of Dr. DuMont which he gave before the RCA tri-color tube receivers were demonstrated, no reference is made to his testimony after that demonstration that there are no inherent limitations in the brightness obtainable with the RCA tri-color tube (Tr. 9936-37).

Nor is any reference made by appellees to the testimony of Dr. Engstrom of RCA that in the month following the first demonstration of the tri-color tube, the brightness of one of the two types of tubes was increased by 100 per cent and the brightness of the other by 50 per cent (Tr. 10872-73).

Nor is there any reference by appellees to other testimony that the brightness which was demonstrated prior to

the close of the testimony on May 26, 1950 was not the ultimate RCA brightness performance. The testimony was that the picture brightness of the RCA tri-color tube has improved and will continue to improve (Tr. 7842, 7987, 8121, 9548, 10399, 10872-73).*

Nor is there any reference by appellees to the fact reported to the Commission on July 31, 1950, more than a month before this finding was made, that the brightness of its receivers had already increased by almost 300 per cent over the brightness demonstrated on April 6, 1950 (R. 137, 400).

c. Compatibility: Quality of Black and White Pictures From Color.

The testimony of Adrian Murphy, Vice President of CBS, is cited to support the proposition that black and white pictures received without alteration on existing black and white receivers from RCA color broadcasts is somewhat inferior to present black and white pictures (Appellees' Brief, pp. 11-12). However, Mr. Murphy gave unwitting but nevertheless eloquent evidence to the contrary on the record.

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* Appellees state there is "doubt" as to whether the duty cycle of the RCA color television system places a fundamental limitation on brightness potential (Appellees' Brief, p. 9). The hearing references it gives are all to Dr. Goldmark. This testimony appellees, and the Commission, stack against the diametrically opposite views of all the other experts who testified at the hearing concerning this matter. Since appellees' reference is apparently to the brightness obtainable with the RCA system using the tri-color tube it may be noted that Dr. Goldmark's expertise in this field may be judged in part in light of the fact that although he testified in March, 1941 that he had developed a tube which produced a color picture within the tube without moving parts (Docket 5806, p. 2607), he nevertheless testified before the Commission in March, 1950 that he had not been able to make such a tube (Tr. 6539-40).

At one point during the color television demonstrations in November, 1949, Murphy stated on the record his opinion that the standard black and white receiver which was being shown was operating on standard black and white signals (Tr. 5933). Actually, however, as was pointed out at the time, Murphy was mistaken. That receiver was reproducing black and white pictures from RCA color transmissions. Mr. Murphy was unable to detect the difference (Tr. 5933).

The testimony of Mr. Fink is also of interest:

> ". . . what I have seen in the black and white version of the RCA color pictures convinces me that a dot interlace black-and-white picture is satisfactory, does not represent a degradation of service ..." (Tr. 8083).

This is fully supported by other evidence (Tr. 6051-53, 6056-60, 6096-97, 7465-70, 10462-64).

The excellent quality of the black and white pictures received from RCA color transmissions is further attested by the broadcasts of RCA color over WNBW in Washington, D. C. More than 800 hours of broadcasts of the RCA color system were made under circumstances closely approximating commercial operating conditions (Exhibit 427). The favorable response of the public to these broadcasts attests to their high quality (Exhibits 364, 365, 366, 367).

Written responses commenting on these broadcasts included such as the following (Exhibit 367):

> (1) "Your color tests came through beautifully on my black and white set. All outlines are very clearly defined."
>
> (2) "I have viewed your telecasts on my Black and White Motorola, early model, and the picture has been clear and sharp. The fact that you were broad-

casting the color pictures did not affect the reception on my Motorola in the least."

(3) "Your Channel 4 color program is received *better* than any other channel. Color programs come in *better* than the regular programs." (Emphasis in original).

(4) "Reception was equally as good and possibly better than standard telecasts."

(5) "The show was viewed in black and white and was equally as clear and distinct as your conventional telecasts which are tops."

(6) "The picture is coming through very sharp and clear. Much better than other programs in black and white."

(7) "We seem to get the color program much clearer and neater than the regular programs."

d. Color Fidelity.

In appellants' main brief it is shown that on the basis of the record as a whole the only proper conclusion which can be reached is that the color fidelity of the RCA color television system is of high quality (Appellants' Brief, pp. 69-74).

Appellees, however, are persistent in their reliance on outmoded and superseded evidence. In their brief they state that "At all of its demonstrations on the record, RCA had difficulty producing a picture with adequate color fidelity" (Appellees' Brief, pp. 9-10). In support of this statement appellees cite, in addition to a paragraph of the Commission's First Report, a total of 22 transcript references. More than half of these references were to testimony given in the fall of 1949. This was before RCA had made certain improvements in the performance of its system, improvements which led to such comments as that by

one Commissioner with reference to the showing of RCA color at the February 23, 1950 demonstration (Tr. 6900):

> "... we have seen that [the RCA system] and it produced beautiful color."

Of the 22 citations, moreover, 16 were to CBS witnesses, 1 to Chapin and 1 to an interested CTI witness. The remaining 4 citations were to testimony of Dr. DuMont and Dr. Goldsmith of the DuMont Laboratories. Of those references, 3 were to testimony given in 1949. The other, and only remaining citation, was to testimony of Dr. Goldsmith. On the same page of the transcript cited by appellees, it shows that Dr. Goldsmith stated (Tr. 9926):

> "Theoretically the RCA type system . . . can probably give the highest color fidelity of any of the systems."

Again, at page 53 of their brief, appellees state that "In respect of RCA color fidelity as demonstrated, the record is replete with testimony commenting adversely thereon." In support, they list 26 citations, which are substantially the same as those previously enumerated. More than half of these references are also to outmoded 1949 testimony.

Of the 26 references, 17 are to CBS witnesses, 2 to Chapin and 1 to an interested CTI witness. The remaining 6 citations are to Dr. DuMont and Dr. Goldsmith. Of these, 5 are to testimony given in 1949. The other reference is to the page of Dr. Goldsmith's testimony in 1950 which, as shown above, also sets forth his testimony as to the potential superiority of the RCA system with respect to color fidelity (Tr. 9926).

In the discussion of RCA color fidelity in their brief, appellees attempt to make much of certain testimony by Dr.

Goldmark with reference to the performance of an RCA color receiver in late April, 1950 (Appellees' Brief, p. 54). Appellees fail to point out that the receiver referred to was of the dichroic mirror type which had been superseded by the RCA tri-color tube receivers.

e. Registration.

Colonel Lippincott is cited by appellees to support the proposition that misregistration was apparent at all RCA demonstrations on the record (Appellees' Brief, p. 9). Colonel Lippincott's testimony regarding the demonstration on the record of the RCA tri-color tube receivers on April 6, 1950 was

> "I did not see that demonstration" (Tr. 11485)

The particular importance of the tri-color tube demonstration which Colonel Lippincott did not see is indicated by the testimony of Mr. John Christensen, chief engineer of the Engineering Research Division of CBS, that

> "I would expect the RCA tube to eliminate the problem of registration at the receiver . . . " (Tr. 11679)

Similarly, reference is made by appellees to the testimony of Dr. Goldsmith of DuMont Laboratories, and Dr. DuMont himself, to support the finding that "registration is a severe problem . . . at the camera . . ." (Appellees' Brief, p. 9).

The exact testimony of these witnesses is of interest.

Dr. DuMont stated that there was some problem in registry at the camera end but that

> ". . . *there are ways and means to overcome that.* It is just a question of time." (Tr. 9380)

Dr. Goldsmith stated that

> "We believe there are developments in the mill which can overcome that particular [camera] registration problem . . ." (Tr. 9921)

Dr. Goldsmith further stated

> *"The registration I don't believe is a fundamental limitation of the RCA system . . .* Even at the camera end. I think they have done a wonderful job of keeping three tubes under control . . . *the registration problem is just an equipment limitation at the present time, it is not a fundamental limitation. It can be overcome completely."* (Tr. 9954-55)

When asked by Commission counsel whether Dr. Goldsmith had "complete confidence" in the fact that camera registration as a problem for RCA could be overcome completely, Dr. Goldsmith's answer was, "Yes." (Tr. 9955)

The testimony of Mr. Fink and of Dr. Baker of General Electric is also of interest.

Mr. Fink stated that registration "is a problem which is defined very definitely in electrical, optical and mechanical terms and, therefore, is presumably a matter of engineering; can be approached as and on a strictly engineering basis, to improve it in the same way as we have improved everything else in television." (Tr. 2076-77)

Dr. Baker testified:

> "I feel confident that it [registration at the camera] can be licked." (Tr. 9629)

f. Resolution.

To contradict the finding by the Condon Committee that the RCA system has the same resolution or picture

detail as the standard black and white system, appellees have referred among other things, to the testimony of Mr. Plummer, Chief Engineer of the Commission (Appellees' Brief, p. 10).

The uncontradicted testimony of Mr. Plummer with respect to a test reading of resolution on the record was that it was a fair inference that the RCA system can achieve a horizontal resolution as great as that which could be achieved by the standard black and white system using the same test pattern (Tr. 6703-05).

g. Picture Texture.

With respect to RCA picture texture, appellees make the surprising statement with reference to that part of the basic finding stating that "it is difficult to see how these defects can be eliminated" that "appellants have not attacked [this finding] in this Court" (Appellees' Brief, p. 60). On the contrary, appellants in their main brief showed not only that the texture of the RCA picture was satisfactory but that any possible deficiencies in that respect had been overcome (Appellants' Brief, pp. 74-75). Thus, as was stated in the RCA Progress Report of July 31, 1950 (R. 400):

> "The elimination of dot structure and moire pattern is due to the use of improved circuits in the receivers which make better use of by-passed 'mixed highs' ".

Clearly a finding that "it is difficult to see how these defects can be eliminated" is "attacked" and rebutted when it is shown that any possible deficiencies have been eliminated.

h. Convertibility.

The convertibility of the RCA system is discussed at pages 12 and 13 of this Reply Brief. As there shown, the

RCA system is a convertible system, and appellees' claim that it is not is wholly unwarranted.*

i. Equipment Considerations.

To support the Commission's finding that at none of the demonstrations was a "practical" RCA home receiver shown, extensive reference is made to testimony regarding the early model RCA color receivers which were superseded entirely by the RCA tri-color tube receivers (Appellees' Brief, pp. 12-13, 61-64). What conceivable relevance this superseded testimony can have is not clear.

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* Appellees try to base the Commission's refusal to look at or consider improvements and new developments in the RCA system to a large extent upon the wholly erroneous assertion that RCA in 1946 and 1947 supported a simultaneous system of color television which "never survived field testing" and "proved to be a failure even before it emerged from the laboratory" (Appellees' Brief, pp. 92, 129, 139). The fact is that the simultaneous system has "survived", has "emerged from the laboratory", and, as modified to enable it to operate in 6-megacycle channels, is the RCA color television system today. The Commission was fully advised of this by RCA at the outset of the hearings (Tr. 2655-60, 2812; Exhibit 206). Thus, it was stated that the RCA color television system

> ". . . has its roots in the simultaneous method first disclosed by Radio Corporation of America on October 30, 1946 and subsequently described in detail at the Hearing in Docket No. 7896.
>
> "The new system, as in the case of the wide-band simultaneous system, is completely compatible with the current black and white television system.
>
> "In addition, the new system includes later developments which, in essence, compress the simultaneous system into a 4-megacycle band suitable for a total channel assignment of 6 megacycles. Not only is the system so compressed, but no detail is lost in the process. This in turn insures a high-definition color picture, while at the same time preserving the normal definition of the black-and-white picture.
>
> "The compression of the simultaneous system is accomplished by a combination of two processes:
>
> "(a) use of the mixed-highs principle; and
>
> "(b) color-picture sampling and time-multiplex transmission." (Exhibit 209)

Again, as stated by the District Court,

> ". . . a number of critical findings are based upon evidence which was taken in the early stage of the proceeding which is not representative of the situation as it existed at the time the findings were adopted" (R. 871).

Appellees also assert that the RCA receiving apparatus is complex and costly (Appellees' Brief, pp. 13, 62). As appellants show in their main brief, both assertions are clearly unsupportable on the basis of the whole record (Appellants' Brief, pp. 75-79).

With respect to the question of complexity, even Chapin admitted, on cross-examination, that there is not "much significant difference" between RCA and CBS (Tr. 10632).*

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*In their brief appellees assert that RCA color receivers are expected to be more complex than CBS receivers "because a time error of only 1/11,000,000 of a second adversely affects color fidelity" (Appellees' Brief, p. 13). This assertion is both inaccurate and misleading (R. 297-298). As RCA in its Comments of September 28, 1950 advised the Commission (R. 298):

> "The ordinary black and white television receiver provides an accuracy in its synchronization process which is of the same order. If the synchronized horizontal scanning wave in such a receiver were to be shifted in time by 1/7,000,000 of a second in successive frames, details of the picture would be mislocated by approximately the width of a normal picture element, thereby losing half the picture resolution. Since most receivers suffer no appreciable loss of resolution, even in the presence of a noisy signal, the accuracy provided is far better than 1/11,000,000 second.
>
> "For black and white television receivers the required accuracy is obtained through the use of automatic frequency control circuits. These same circuits can be effective in maintaining the needed accuracy for color television. The receiver circuit functioning is synchronized by the 'burst' precisely at the start of each scanning line. Consequently the color control circuits are 'on their own' for only 1/15,750 second, or the time of one scanning line.
>
> "Tolerances of this order are encountered in many types of electronic equipment, such as radar and shoran *upon the operation of which the safety and lives of men depend.*"

Dr. DuMont testified (Tr. 9391):

> "I think it [CBS equipment] is probably a little more complex than . . . RCA."

Mr. Smith of Philco stated (Tr. 8275):

> ". . . it [the RCA system] will give you the most practical form of color television I have seen yet."

With respect to receiver costs, the unchallenged estimate of the cost of an RCA tri-color tube receiver is that it will be between 25 and 50 per cent more than a black and white receiver of the same size (Tr. 7864-65, 10082). RCA's Chairman of the Board, Brigadier General Sarnoff, testified (Tr. 10044):

> "RCA color receivers can be manufactured and sold for prices that will be competitive with any other color receiver that has been demonstrated or proposed."

Both Mr. Smith of Philco and Dr. DuMont testified that RCA receiver costs would probably be less than those of CBS (Tr. 8201, 9392).

Similarly, appellees' effort to establish support for the assertions as to the complexity and cost of RCA studio equipment ignores the fact that the reliability in day-to-day operation of the RCA studio equipment is established not only by testimony but also by actual operating experience over Station WNBW in Washington—operating experience which closely approximates day-to-day commercial operating conditions and which were on the air regularly from January, 1950 down to the date of the Commission's order (Tr. 6051, 6107-08, 7227; Exhibits 427, 429, 430).

The Record as a Whole Does Not Support the Criteria Chosen by the Commission.

In appellants' main brief it was pointed out that the adoption of the CBS system was premised upon certain criteria which the Commission had formulated for the first time *after* the hearings had ended (R. 155-56), that it was apparent from the omissions from these criteria that the ones selected were tailored to fit the CBS system and to make possible its adoption, and that there was no support in the record for the omission of other and more important criteria which would have precluded the adoption of the CBS system (p. 84).

Appellees now contend that the Commission's selection of criteria does not have to be supported by the record and that the only question involved is as to the *a priori* reasonableness of the Commission's choice of criteria (Appellees' Brief, p. 85). It would seem clear that neither on the basis of the record nor on the basis of reason could the Commission have selected the criteria it did. Furthermore, the selection of criteria may be so decisive of the administrative result that such criteria should not be adopted without substantial support in the record. Otherwise the Commission can so tailor its criteria, as it did in this case, that it can reach a result completely contrary to the almost unanimous testimony of the experts appearing before it.

The answer to the question whether one would prefer to own a horse and buggy or an automobile today seems obvious. But if the factors of speed, endurance and comfort are excluded, some might feel that the answer would be entirely different.

POINT VI.

Reply to Argument That the Court Below Afforded Appellants Proper Judicial Review.

In their main brief appellants contend that the court below should have reviewed "the record as a whole" in order to determine with respect to the decision of the Commission whether "the evidence supporting that decision is substantial, when viewed in the light that the record in its entirety furnishes." *Universal Camera Corporation* v. *National Labor Relations Board*, ... U. S. ....., 71 S. Ct. 456; *National Labor Relations Board* v. *The Pittsburgh Steamship Company*, ... U. S. ....., 71 S. Ct. 453.

Appellees do not expressly claim that the court below afforded appellants such judicial review.* Indeed, appellees could not properly do so since the court below avoided the performance of this duty by stating (R. 871):

> "While the findings of the Commission are severely criticized, it is not contended in the main that they are not supported by substantial evidence."

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* Appellees refer to a statement by one of the judges of the court below made in the course of the oral argument to the effect that they were going to give the case their "best thought" (Appellees' brief, p. 118). This is apparently cited as evidence of an intention by that member of the court thereafter to consider the issues carefully. If its opinion, however, the majority of the court conceded that its consideration of the case was not the careful study which the case merited. The majority opinion states that

> "in studying the case, we have been unable to free our minds of the question as to why we should devote the time and energy which the importance of the case merits . . ." (R. 866)

Appellees attempt to read into the *Universal Camera* case an indication that the Seventh Circuit "had previously been applying the 'record as a whole' test" is unwarranted (Appellees' Brief, p. 123). As is pointed out in appellants' main brief (p. 135), the case shows to the contrary.

Of necessity, therefore, appellees are reduced to an unsupported assertion that there is no contention by appellants that the order and findings of the Commission are not supported by substantial evidence. As is shown in appellants' main brief, appellants vigorously contended before the lower court, as they now contend, that there is no substantial support for the order and findings of the Commission (pp. 58-97, 136-137).

In the appellants' main brief it is shown that in many other important respects the court below did not afford proper judicial review. Decisive and controlling questions in the case were left entirely unresolved by the District Court (Appellants' Brief, pp. 138-139).

Appellees do not and could not claim that these matters were decided by the court below.* Nor do appellees explain the statement by the court below that (R. 866):

> ". . . we have been unable to free our minds of the question as to why we should devote the time and energy which the importance of the case merits, realizing as we must that the controversy can only be finally terminated by a decision of the Supreme Court. This is so because any decision we make is appealable to that court as a matter of right and we were informed during oral argument, in no uncertain terms, that which otherwise might be expected, that is, that the aggrieved party or parties will immediately appeal. In other words, this is little more than a practice session where the parties

* There is no proper basis for appellees' speculation that even if the court below had afforded appellants full and proper judicial review, and had followed the proper standard in such review, the result would have been the same (Appellees' Brief, p. 123). Indeed, if the court below, contrary to the holding of this Court in the *Universal Camera Corporation* case, had not proceeded on the erroneous premise that its "scope of review" was "so firmly delineated", the decision of the court would have been quite different.

prepare and test their ammunition for the big battle ahead."

Appellees do not explain the court's statement, it is submitted, for the reason that it is apparent that the District Court intended to leave consideration of the merits of appellants' case to this Court. Indeed, as the District Court further stated (R. 875):

> "Thus, as we evaluate the situation, there are *two* courses open, (1) to allow defendants' motion for a summary judgment, and (2) to vacate the order and send the proceeding back to the Commission for further consideration in view of recent developments in the color television field as well as the rapidly changing economic situation. A pursuance of the latter course, assuming we have such authority, of which there may be doubt, would inevitably result in the prolongation of the controversy which badly needs the finality of decision which can be made only by the Supreme Court. In other words, the interests of all, so we think, will be better served with this controversy on its way up rather than back from whence it comes."

The plain failure of the District Court to afford proper judicial review in this case leads appellees to attempt to transform this Court into a court of first instance. Indeed, this is what appellees are ultimately reduced to in their endeavor to salvage the order of the District Court (Appellees' Brief, p. 122).

In these circumstances, it is submitted, the judgment of the court below should be reversed. *Lutcher & Moore Lumber Co.* v. *Knight*, 217 U. S. 257; *Ex parte Harley-Davidson Motor Co.*, 259 U. S. 414; *Oklahoma Natural Gas Co.* v. *Russell*, 261 U. S. 290; *Federal Communications Commission* v. *WJR, The Goodwill Station, Inc.* 337 U. S. 265.

Conclusion.

For these reasons it is submitted that the decision of the District Court dismissing appellants' complaint should be reversed and the cause remanded to that court for the issuance of a permanent injunction against the order.

Respectfully submitted,

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IN THE

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OCTOBER TERM, 1950

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v.

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Appeal From the District Court of the United States for the Northern District of Illinois, Eastern Division.

BRIEF FOR THE UNITED STATES, THE FEDERAL COMMUNICATIONS COMMISSION, AND COLUMBIA BROADCASTING SYSTEM, INC.

INDEX.

	Page
Opinions below	1
Jurisdiction	2
Questions presented	2
Statute involved	3
Statement	3
A. The Commission's order	4
B. The proceedings before the Commission	5
C. The Commission's findings and conclusions	7
1. The RCA dot sequential system	8
Flicker	8
Brightness	9
Contrast	9
Registration	9
Color fidelity	9
Resolution	10
Picture texture—over-all picture quality	11
Susceptibility to interference	11
Compatibility; quality of black and white pictures from color	11
Convertibility	12
Equipment considerations	12
Conclusions concerning the RCA system	14
(1) Color fidelity	14
(2) Texture	15
(3) Receiving equipment	15
(4) Station transmitting equipment	15
(5) Interference	15

Page

(6) Networking 15

(7) Field testing 16

2. The CBS field sequential system 16

Flicker 16

Brightness—contrast 17

Registration—color breakup and fringing 17

Color fidelity 18

Resolution 18

Picture texture—over-all picture quality 19

Susceptibility to interference 19

Adaptability; quality of black and white picture from color .. 19

Convertibility 20

Equipment considerations 20

Conclusions concerning the CBS system 21

(1) Texture, color fidelity, and contrast 21

(2) Receivers and station equipment 22

(3) Susceptibility of flicker 22

(4) Susceptibility to color fringing and color breakup 22

(5) Geometrical resolution 22

(6) Picture size 22

D. The Commission's conclusions concerning postponement of the adoption of standards 23

E. The Second Report 28

Summary of argument 32

ARGUMENT:

I. The Commission's order was reasonable and the court below properly so found 40

Introduction 40

A. The Commission's findings of fact have the requisite evidentiary support 45

1. The appellants' general criticisms of the Commission's findings of fact are baseless 45

Page

2. The appellants' specific criticisms of the Commission's findings of fact are baseless 52

(a) Findings concerning RCA 53

RCA color fidelity 53

RCA picture texture 58

RCA receiving equipment 61

RCA transmitting equipment 65

RCA network transmission 67

RCA susceptibility to interference 68

Field testing of the RCA System 69

(b) Findings concerning CBS 71

CBS picture quality and system equipment 72

CBS "susceptibility to flicker" 74

CBS geometric resolution 79

CBS picture-size limitation 82

3. Summary and conclusions 83

B. The Commission's choice of criteria for adoption of a color system was reasonable 85

(a) Resolution; picture size; flicker-brightness 85

(b) "Effectiveness of channel utilization" 88

(c) Compatibility 89

C. The Commission's action in seeking a means to prevent the aggravation of the compatibility problem in order to permit further consideration was reasonable 96

D. The Commission properly refused to adopt transmission standards permitting regular broadcasting under the RCA system 101

1. The Commission has the power, under the Communications Act, to refuse to set standards for an unsatisfactory system 103

2. The establishment of a single standard is consistent with the Commission's statutory duty to foster competition 108

3. The Commission was not required to make findings on the issue of "multiple standards" 111

E. The court below properly sustained the Commission's order 113

Page

II. The procedures adopted by the Commission were reasonable 124

A. The Commission properly refused to base any determination on *ex parte* consideration of material outside the record and properly failed to reopen the record on the basis of such material 124

1. The Commission properly refused to base any determination on the *ex parte* consideration of the progress and Condon Committeee Reports 126

2. The Commission's failure to reopen the record on the basis of the Progress and Condon Committee Reports was reasonable and proper 133

B. The Commission's denial of RCA's petition to postpone decision was a reasonable exercise of its discretion 135

C. The participation in the proceedings of Chapin, a Commission staff engineer, was proper and did not vitiate the Commission's order.. 143

III. The District Court properly quashed the subpoenas *duces tecum* issued at the request of Pilot Radio Corporation 149

Conclusion 152

Appendix A 153

Appendix B—Tabular Comparison on CBS and RCA Systems as Found by the Commission. 156

CITATIONS.

CASES:

Allen Co. v. *Cash Register Co.*, 322 U. S. 137 124
American Telephone and Telegraph Company v. *United States*, 299 U. S. 232 ..... 32, 41, 115
Berkshire Employees Association v. *National Labor Relations Board*, 121 F. 2d 235 151
Champlin Refining Co. v. *Commission*, 286 U. S. 210 ..... 39, 148
Chicago B. & Q. Ry Co. v. *Babcock*, 204 U. S. 585 150
Chicago, R. I. & P. Ry. v. *United States*, 284 U. S. 80 41
El Dorado Oil Works v. *United States*, 328 U. S. 12 120
Erie R. Co. v. *Tompkins*, 304 U. S. 64 119
Federal Communications Commission v. *Sanders Radio Station*, 309 U. S. 470 110
Federal Security Administrator v. *Quaker Oats Co.*, 318 U. S. 218.. 41, 84
Helvering v. *Winmill*, 305 U. S. 79 105
Houston v. *St. Louis Independent Packing Co.*, 249 U. S. 479 41

Page

Interstate Commerce Commission v. *City of Jersey City*, 322 U. S. 503 ..... 37, 120, 1 1, 135
Jacob Siegel Co. v. *Federal Trade Commission*, 327 U. S. 608..... 112
Lutcher & Moore Lumber Co. v *Knight*, 217 U. S. 257..... 119
Murphy Oil Co. v. *Burnet*, 287 U. S. 299..... 105
National Broadcasting Company v. *United States*, 319, U. S. 190 ..... 32, 41, 84, 110, 116, 121
National Labor Relations Board v. *LaSalle St el Co.*, 178 F. 2d 829... 123
National Labor Relations Board v. *Pittsburgh S. S. Co.*, 337 U. S. 656.. 49
North Whittier Heights C. Ass'n v. *National Labor Relations Board*, 109 F. 2d 76, certiorari denied, 310 U. S. 632..... 52
Norwegian Nitrogen Products Co. v. *United States*, 288 U. S. 294.... 105
Opp. Cotton Mills v. *Administrator*, 312 U. S. 126..... 41, 84
Pacific States Box & Basket Co. v. *White*, 296 U. 176..... 41
Radio Cincinnati v. *Federal Communications Commission*, 177 F. 2d 92.. 100
Railroad Commission of Texas v. *Rowan & Nichols Co.*, 310 U. S. 573; 311 U. S. 570 41
St. Joseph Stock Yards Co. v. *United States*, 298 U. S. 38..... 41
Schmidt v. *United States*, 177 F. 2d 450 118
Securities and Exchange Commission v. *Chenery Corporation*, 318 U. S. 80 112
Simmons v. *Federal Communications Commission*, 145 F. 2d 578; 169 F. 2d 670, certoriari denied, 335 U. S. 846 112
Steward Machine Co. v. *Davis*, 301 U. S. 548..... 100
Swayne & Hoyt, Ltd. v. *United States*, 300 U. S. 297..... 84
Switchmen's Union v. *National Mediation Board*, 320 U. S. 297..... 119
Terminiello v. *Chicago*, 337 U. S. 1..... 119
Tex. & Pac. Ry. v. *Hill*, 237 U. S. 208..... 114
Universal Camera Corporation v. *National Labor Relations Board*, No. 40, this Term 42, 52, 84, 119, 123
United States v. *American Trucking Assns*, 310 U. S. 534..... 105
United States v. *Morgan*, 313 U. S. 409..... 39, 148, 149, 150
United States v. *Pierce Auto Lines*, 327 U S. 515..... 37, 120, 121, 135
United States v. *Rock Royal Co-Operative*, 307, U. S. 533 41
United States v. *Yellow Cab Co.*, 338 U. S. 338..... 49
Wong Yang Sung v. *McGrath*, 330 U. S. 33 44

STATUTES:

Administrative Procedure Act, 60 Stat. 237, 5 U. S. C. 1001, *et seq:*

Section 3(a) 143
Section 4(b) 43, 132, 133, 154
Section 7 43
Section 8 43
Section 10 (e) 32, 42, 43, 44, 116 55

Page

Communications Act of 1934, 48 Stat. 1064, as amended, 47 U. S. C. 151 *et seq:*

Section 3(o) 103, 104
Section 4(i) 103, 153
Section 301 153
Section 303 ..... 103, 153
Section 303(b) 35, 41, 103, 154
Section 303(c) 154
Section 303(e) 35, 41, 103, 104, 105, 154
Section 303(f) 154
Section 303(g) 41, 103, 154
Section 303(r) 103, 154
Section 402(a) 119
Section 402(b) 119
Section 402(e) 119

Defense Production Act of 1950, Pub. Law 774, 81st Cong. 2d Sess. 143

Hobbs Act, Public Law 901, 81st Cong. 2d Sess. 119

Labor Management Relations Act, Sec. 10(e), 29 U. S. C. (Supp. III) 160(e) 119

Radio Act of 1927, 44 Stat. 1162 110

Section 4(e) 104, 105

MISCELLANEOUS:

Attorney General's Committee on Administrative Procedure, Final Report, S. Doc. 8, 77th Cong., 1st Sess. 41

68 Cong. Rec. 2880-2881 104

68 Cong. Rec. 3033-3034 104

Commerce Dept. Order No. 123, 15 F. R. 6182 143

Federal Communications Commissions:

Part 3, Rules Governing Standard and High Frequency Broadcast Station, Subpart B, Rules Covering High Frequency Broadcast Stations (June 21, 1940), 5 Fed. Reg. 2382 105

Report of March 20, 1941, Television Hearing (Mimeo. 49851) 105

Report of March 18, 1947, (Mimeo. 5466), 11 F. C. C. 1523 .. 5, 49, 50, 95

Statement of Organization Sec. 0.30 (formerly Sec. 1.37 of the Commission's Rules, 47 C. F. R. (1946 Supp.) Sec. 1.37 143

Page

Federal Radio Commission, Second Annual Report, (1928), p. 20; Fourth Annual Report (1930), p. 59; Fifth Annual Report (1931), p. 6; Sixth Annual Report (1932), p. 28 105

14 Fed. Reg. 4483 5

Report of the Advisory Committee on Color Television to the Senate Committee on Interstate and Foreign Commerce, S. Doc. 197, 81st Cong., 2d Sess. 124

Senate Judiciary Committee Print of the Administrative Procedure Act, in S. Doc. No. 248, 79th Cong., 2d Sess. 43, 44

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OPINIONS BELOW.

The Order of the Federal Communications Commission here in issue (R. 432) appears at 15 F. R. 7013. The reports of the Federal Communications Commission (R. 95,

413) have not been officially reported, but appear in 1 Pike & Fischer, *Radio Regulation* (part 2), pp. 91:261 and 91:441. The opinions in the District Court of the United States for the Northern District of Illinois, Eastern Division (R. 863) have not yet been reported in the Federal Supplement but they appear in 6 Pike & Fischer, *Radio Regulation*, p. 2073.

JURISDICTION.

The judgment of the Court below (LaBuy, J., dissenting) was entered on December 22, 1950 (R. 863, 879). A petition for appeal therefrom was filed on January 25, 1951, and the appeal was allowed on the same day (R. 892). On March 5, 1951, this Court noted probable jurisdiction. The jurisdiction of this Court on this appeal rests on 28 U. S. C. 1253 and 2101(b).

QUESTIONS PRESENTED.

The Federal Communications Commission, after hearing, amended its "Standards of Good Engineering Practice" for television transmissions so as to authorize the regular non-experimental broadcasting of color television under the field sequential system. The questions presented are:

1. Whether the decision of the Federal Communications Commission that the field sequential system of color television is suitable and the dot sequential system not suitable for regular non-experimental broadcasting, is reasonable.

2. Whether the Federal Communications Commission considered all evidence properly presented in reaching its determination to adopt standards for color television based on the field sequential system, and whether the conduct of the hearings was in all other respects in conformity with law.[1]

[1] An incidental question presented is whether the court below properly quashed subpoenas *duces tecum* requested by Pilot Radio Corporation. This matter is briefly discussed *infra*, pp. 149-151.

STATUTE INVOLVED.

The pertinent provisions of the Communications Act of 1934, 48 Stat. 1064, as amended, 47 U. S. C. 151, *et seq.* (hereinafter referred to as the "Communications Act") are printed in the Appendix A, *infra*, pp. 153-155.

STATEMENT.

This suit was brought on October 17, 1950, to set aside the Federal Communications Commission's order (15 F. R. 7013; R. 432), adopted October 10, 1950, and effective November 20, 1950, establishing engineering standards for color television transmissions.

The original plaintiffs were Radio Corporation of America (herein called "RCA"), and two of its wholly-owned subsidiaries, National Broadcasting Company, Inc. (herein called "NBC") and RCA Victor Distributing Corporation (herein called Distributing Corporation). RCA is engaged in the manufacture of black and white television equipment, including receivers (R. 2, 3). It is also engaged in research and development work in the field of television and was the proponent of a color system known as the RCA or dot sequential system (R. 6). NBC is engaged, among other things, in black and white television broadcasting, including such broadcasting on a network basis (R. 2). Distributing Corporation is engaged in the sale of black and white television receivers manufactured by RCA to dealers located in Chicago and other midwestern cities (R. 2, 3).

Over the objections of appellees, the following parties (herein collectively referred to as "intervenor-appellants") were permitted to intervene (R. 864): Emerson Radio and Phonograph Corporation, Pilot Radio Corporation, The Radio Craftsmen, Incorporated, and Wells-Gardner & Co.,—each a manufacturer of black and white television receivers and equipment (R. 536, 450, 528,

493); Sightmaster Corporation, which alleged it had been a manufacturer of black and white television receivers (R. 519); Local 1031, International Brotherhood of Electrical Workers, AFL, a labor organization whose members are employed by manufacturers of television receivers, parts and equipment in the Chicago area (R. 545-6); and Television Installation Service Association, a trade association of companies engaged in the installation and servicing of television receivers in the Chicago area (R. 505).

Columbia Broadcasting System, Inc. (herein referred to as "CBS") was, without objection, permitted to intervene as a defendant (R. 486). CBS is not a manufacturer of television receivers or equipment, but it is engaged in black and white television broadcasting, including such broadcasting on a network basis. It is also engaged in research and development in the field of color television and was the proponent of a color system known as the CBS or field sequential system. (R. 485.)

The complaint alleged in substance that the order of the Federal Communications Commission (hereinafter called "the Commission") is illegal under the Communications Act of 1934, is arbitrary, unreasonable, unconstitutional, and unsupported by substantial evidence, and that it was vitiated by improper procedures (R. 13).

On October 27, 1950, the Government and CBS filed motions to dismiss the complaint or, in the alternative, for summary judgment (R. 437, 490). The court below (LaBuy, J., dissenting) granted the motions and dismissed the complaint (R. 863). At the same time, however, the District Court on its own motion also continued in force until April 1, 1951, or until terminated by this Court, a temporary restraining order which the District Court had granted previously (R. 882).

A. *The Commission's order.* The Commission's order amended its Standards of Good Engineering Practice by

adopting engineering standards for color television transmissions (R. 432).[2] The order did not require any broadcaster to broadcast color television. Its only effect was to provide that if a licensed broadcaster chooses to broadcast color television on a regular non-experimental basis, the signals transmitted must conform to the technical engineering standards adopted by the Commission.

B. *The proceedings before the Commission.* The Commission proceedings culminating in the order adopting standards for color television broadcasting[3] may be summarized as follows:

On July 11, 1949, the Commission issued, as a part of a larger proceeding the other phases of which are not immediately relevant herein, a Notice of Further Proposed Rule Making (R. 16; 14 F. R. 4483). This notice invited proposals for a change in existing transmission standards looking toward the inception of color television service and

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[2] Until such standards are set for a particular broadcast service—whether radio, black and white television, or color television—there can be no regular broadcasting of that service. Unless standards, prescribing the engineering characteristics of the signal to be transmitted, are first set by the Commission, each licensed broadcaster would be free to transmit whatever type of signal he chooses, regardless of its interfering effect on other radio stations and regardless of the capabilities of the signal in producing a satisfactory quality of sound or picture on home receivers. In addition, those who wish to receive broadcasts would either be required to purchase a different receiver for each different type of signal broadcast, or they would be able to receive only those signals which their particular receivers were fitted to receive. Accordingly, the Commission has always established a single set of transmission standards for each particular service (AM radio, FM radio, and black and white television) in order to avoid such interference and to assure that members of the public will receive a uniform satisfactory service. See "Report of the Commission" (mimeo. 5466), March 18, 1947, 11 F. C. C. 1523. See also *infra*, pp. 103-111.

[3] In 1941, the Commission had adopted standards for the regular non-experimental broadcasting of black and white television. See First Report, Par. 8, R. 102-4.

described the conditions upon which proposals would be considered; it also invited comments from any interested persons who wished to participate in the color television phase of the hearing.

Pursuant to the notice of July 11, 1949, nine organizations or individuals filed comments within the time prescribed; eight of them participated in the hearing as parties (First Report, Par. 23, R. 112). None of the intervenor-appellants filed such comments or participated in the hearings. Only three parties proposed color television systems for consideration: RCA proposed a dot sequential system, Color Television, Inc. (herein referred to as "CTI"), proposed a line sequential system, and CBS proposed a field sequential system (R. 112-3).

The hearing on the color television issues was held before the Commission *en banc* beginning on September 26, 1949, and ending May 26, 1950—consuming a total of 62 hearing days and covering 9,717 pages of transcript. The hearing was held in two phases, the first of which began on September 26 and ended on November 22, 1949, and the second of which began on February 20, and ended on May 26, 1950. During the intervening period, the proponents and certain other parties conducted field tests of color television systems pursuant to the Commission's "Notice Concerning Field Test Programs and Further Testimony" (Tr. 885; First Report, Par. 24, R. 113).

In all, 53 witnesses testified and 265 exhibits were received (R. 113). All testimony was under oath and subject to cross-examination. During the hearings, in addition, eight demonstrations were conducted on the record: CBS demonstrated its system on October 6 and 7, 1949, and certain new developments on April 26, 1950; RCA demonstrated its system on October 10, 1949, and certain new developments on April 6, 1950; CTI demonstrated its system on February 20 and May 17, 1950. On November 21 and 22, 1949, comparative demonstrations were conducted showing the operation, side-by-side, of standard black and white television, the RCA color system

and the CBS color system. On February 23, 1950, similar comparative demonstrations were conducted of the RCA, CTI and CBS color systems (R. 114).

Pursuant to the Commission's Notice of May 10, 1950, the parties were permitted to file Proposed Findings and Conclusions, and replies thereto, after the close of the hearings. Such proposals and replies were submitted by RCA and CBS among others (R. 98; Tr. 15748, 15306, 15960, 15858).

On September 1, 1950, the Commission issued its First Report covering the color television issues (R. 95). On October 10, 1950, it issued its Second Report (R. 413). The findings and conclusions embodied in these reports are summarized in the next succeeding section.

C. *The Commission's findings and conclusions.* In the First Report, the Commission concluded that "color is an important improvement in television broadcasting. It adds both apparent definition and realism to pictures. It opens up whole new fields for effective broadcasting, rendering life-like and exciting scenes where color is of the essence—scenes which in black and white television are avoided or, if telecast, have little appeal" (R. 154-5). The Commission also made extensive and unanimous findings and conclusions evaluating the performance of each of the proposed color systems. The salient findings and conclusions (a tabular comparison of which is set out as Appendix B hereof, *infra*, pp. 156-158) concerning the RCA and CBS systems[4] may be summarized as follows:[5]

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[4] The Commission also made findings and conclusions concerning the CTI system, on the basis of which it rejected the system as inadequate. CTI has not appealed the Commission's action and hence further reference to the CTI system is omitted.

[5] In the following summary, findings and conclusions other than those which are purely descriptive and the subject-matter of which was not controverted at the hearing, are accompanied by references to those places in the record before the Commission which support the findings. The record before the Commission was filed with the court below in support of the appellees' motions to dismiss the complaint or in the alternative for summary judgment, and also

1. *The RCA dot sequential system.* The RCA color system is a dot sequential system; that is, the color information is picked up ("scanned") by the camera and transmitted picture element by picture element ("dot" by "dot"). This involves a color switching rate, or rate of changing among the three primary colors (red, blue and green), of about 11,000,000 times per second (R. 119, 123-6).

Flicker. No large area flicker was observable at any of the demonstrations. The RCA picture had very low illumination,[6] however, and hence there was insufficient evidence whether the large area flicker characteristics of the RCA color pictures are the same as for black and white (R. 134). Small area flicker in the form of dot motion or twinkle was observable at the demonstrations on the record (R. 134); Tr. 5359, 9937 (T. T. Goldsmith);[7] Tr. 9382, 9550 (DuMont); Tr. 3182, 6606, 9267, 9271, 11216, 11245-6 (Goldmark)). Because of the dimness of the RCA pictures, the seriousness of this problem cannot be entirely ascertained (R. 134).[8]

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in opposition to appellants' motion for preliminary injunction (R. 445). This record has been certified to this Court as an original exhibit. On March 5, 1951, this Court granted a motion to dispense with the printing of this record, but pursuant to a stipulation between the parties which led to this motion, the parties may refer to it in their briefs. The administrative record is referred to hereafter as "Tr".

[6] The perceptibility of flicker increases as brightness increases (R. 129).

[7] Appendix A of the Commission's First Report (R. 171) lists the witnesses and the parties for whom they appeared.

[8] Small area flicker may be minimized or overcome by the use of tubes with long persistence phosphors, although the use of phosphors may affect color fidelity and the portrayal of objects in motion (R. 134).

Phosphors are a chemical coating on the face of the receiving tube which are activated by the electron beam and thus produce the light which makes up the picture. Present tubes use "short persistence" phosphors—*i. e.*, phosphors which become dark quickly after being activated. "Long persistence" phosphors retain light after activation for a longer period; hence they reduce flicker be-

Brightness. At none of the demonstrations on the record was the brightness of the RCA pictures sufficient for ordinary home use (R. 137; Tr. 3578-9, 9279-80, 9301-2 (Goldmark); Tr. 5222 (T. T. Goldsmith); Tr. 5566 (DuMont); Tr. 8460 (Chapin)). While equipment can be developed for the RCA system which will produce higher brightness, there is doubt, which can be resolved only by further testing, whether there is not a fundamental limitation, arising out of RCA's limited duty cycle, on its brightness potential (R. 137; Tr. 9279, 11228, 11257-8 (Goldmark)).

Contrast. The RCA system has difficulty in maintaining adequate contrast in its picture, particularly in fine detail (R. 137; Tr. 6606, 9293, 9301-3, 11206, 11213 (Goldmark); see also Tr. 9457-8 (DuMont); Tr. 10640 (Chapin)).

Registration. In the RCA system, registration[9] is a severe problem both at the camera[10] and receiver; misregistration was apparent at all RCA demonstrations on the record (R. 139-40; Tr. 3121-6, 3133-5, 3572-3, 11200-2, 11204, 11243-5 (Goldmark); Tr. 5090, 5217, 9921 (T. T. Goldsmith); Tr. 5566, 9377, 9380 (DuMont); Tr. 11480-1 (Lippincott); Tr. 8460 (Chapin)).

Color fidelity. At all of its demonstrations on the record, RCA had difficulty producing a picture with adequate

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cause of the shorter periods of interim darkness when there is no activation by the electron beam as it passes back and forth on the tube face.

[9] The registration problem arises from the fact that since color television involves the transmission of separate pictures in different colors, which are then combined into one color picture, it is necessary for the three separate pictures to have the same size and shape and they must appear to lie directly one over the other. Misregistration adversely affects both resolution (see *infra*, p. 10) and color fidelity. (R. 137)

[10] The problem by its nature is far more difficult in the case of outdoor pickups (R. 140; Tr. 11202 (Goldmark); Tr. 11480 (Lippincott)). RCA, however, never demonstrated any outdoor pickup cameras (R. 140).

color fidelity[11] (R. 141; Tr. 3750-1, 3753, 3784-5, 9313 (Judd); Tr. 4765 (McIntosh); Tr. 5219, 5454-5, 9926 (T. T. Goldsmith); Tr. 5566 (DuMont); Tr. 3570-2, 8880-2, 9267-8, 9285-7, 11205-7, 11242-6 (Goldmark); Tr. 8610 (Stanton); Tr. 3803-4 (DuBarry); Tr. 5943, 5947-8, 5954, 6254 (Murphy); Tr. 8460 (Chapin)). This difficulty in maintaining adequate color fidelity arises from several factors which are part of the RCA system, including the problem of registration and the fact that a time error of only 1/11,000,000 of a second in the sampler results in the transmission or receiving of the wrong color (R. 141; Tr. 7392-3 (Jensen); Tr. 3153, 3155-7, 9267-8, 11205-6 (Goldmark); Tr. 4763-5 (McIntosh); CTI Ex. 273, Tr. 4817)).

Resolution. The geometric resolution[12] of the picture produced by the RCA system is not, even in theory, equal to that of the present black and white system for all types of scenes. Its horizontal resolution ranges between 67 per cent and 100 per cent of black and white, and in particular types of scenes, the horizontal resolution may be reduced to 33 per cent. (R. 143; Tr. 7395 (Jensen); FCC Ex. 302 (Tr. 6183), with which compare Tr. 6697-6701, 6705 (Plummer); Tr. 6605-6, 11218-9 (Goldmark); cf. Tr. 9931 (T. T. Goldsmith).) Further, RCA resolution has suffered from the misregistration which has been present at each of the demonstrations on the record[13] (R. 143; see *supra*, p. 9).

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[11] The Commission did note, however, that "Although there is some testimony that at times the color fidelity of the RCA picture was adequate, this was achieved either at a special demonstration not on the record or sporadically on the record" (R. 141). See *infra*, pp. 55-56.

[12] Geometric resolution is defined as "the number of lines which the system can provide"; it is one of the factors which enter into the "apparent definition" (i. e., sharpness and ability clearly to portray detail) of a television picture (R. 142).

[13] If there is camera misregistration of only one of the three images in the camera by only one picture element (i. e., 2/1000ths of an inch) horizontally, and one line (i. e., 2/1000ths of an inch vertically), the geometric resolution of the picture may be decreased to less than half (Tr. 3121, 11201) (Goldmark).

Picture texture—Over-all picture quality (see R. 143). The RCA picture has a soft quality, probably because of difficulties in maintaining contrast, particularly in small areas (R. 144; see p. 9, *supra;* see Tr. 6606 (Goldmark)). RCA picture texture was also marred at all of the demonstrations on the record by the visibility of dot structure (R. 144; Tr. 9382 (DuMont); Tr. 5214, 9937-8 (T. T. Goldsmith); Tr. 8460-1, 8489-90 (Chapin); Tr. 3574, 3582, 3983-4, 6606, 11217 (Goldmark); Tr. 4781 (McIntosh)). The minimization of such structure may be possible, although no means to do so were demonstrated; such elimination is, however, likely to be at the expense of further loss in resolution or contrast, or in both (R. 144; Tr. 9232, 11217 (Goldmark); Tr. 10656 (Chapin); cf. Tr. 9937-8 (T. T. Goldsmith); Tr. 10753 (Brown)).

Susceptibility to interference. While in general, the RCA system has about the same susceptibility to interference as does the standard black and white system, it has a greater susceptibility to oscillator radiation (i.e., interfering signals transmitted by other television receivers, diathermy machines and other kinds of apparatus) than does the black and white television system (R. 145). The interference caused to the RCA system by oscillator radiation is severe and under certain conditions, upsets color synchronization so that color control is lost (R. 145-6; Tr. 8456, 8458-9, 11654 (Chapin); Tr. 8222, 8224-5, 8263-4 (D. B. Smith); FCC Ex. 389, Tr. 8491; FCC Ex. 465, Tr. 11653; RCA Ex. 425, Tr. 10761)).

Compatibility; quality of black and white pictures from color. The RCA system is compatible—that is, no change is required in existing black and white receivers to enable them to receive a black and white picture from RCA color transmissions (R. 149). The picture so received, however, is somewhat inferior to present black and white pictures received from standard black and white transmissions (R. 149; Tr. 5360, 5402, 5964, 9930 (T. T. Goldsmith); Tr. 5567, 9382 (DuMont); Tr. 11540-2 (Lippin-

cott); Tr. 6256 (Murphy); Tr. 4781 (McIntosh); Tr. 8491 (Chapin); Tr. 3182, 6606, 11208-9, 11217 (Goldmark); FCC Ex. 302, Tr. 6183).

Convertibility.[14] No practical converter to enable existing black and white receivers to receive color pictures under the RCA system was demonstrated in the course of the hearings (R. 149; Tr. 8013 (Fink); Tr. 3404, 3450-1 (Goldmark); Tr. 6255 (Murphy); Tr. 5276 (T. T. Goldsmith); Tr. 11386 (Matthews); Tr. 6169-70, 6180, 7858-9 (Engstrom)).

Equipment considerations. At none of the demonstrations was a practical RCA home receiver shown. The receivers first demonstrated by RCA, utilizing dichroic mirrors and three kinescope tubes, were so bulky, complex and expensive, and their controls so critical, that they could not be seriously considered for home use. (R. 152; Tr. 7968 (Fink); Tr. 8459-61, 11657 (Chapin); Tr. 11512 (Lippincott); Tr. 3236, 3240, 8881, 9285, 11240-2, 11245, 11257 (Goldmark); Tr. 5090 (T. T. Goldsmith); Tr. 5566, 5660, 9377, 9380 (DuMont); see Tr. 2674-5, 6065, 7805 (Engstrom); RCA Ex. 309, Tr. 6183; RCA Ex. 316, Tr. 6577; cf. Tr. 5943-4 (demonstration).) On April 6, 1950, RCA demonstrated a receiver using a single tri-color tube (R. 152). Even at this demonstration, however, there was evidence of faulty registration, but it was uncertain whether this was due to the receiver or the camera or both (R. 152; Tr. 11201-2, 11203 (Goldmark)). Since color control is extremely critical in the RCA system, there can be no assurance that the fault does not exist at both ends (R. 152). In any event, since the tube was demonstrated toward the close of the hearings had had very little field testing, and had not been made available either to the parties or to the Commission's laboratory, it is question-

[14] "Convertibility" is the term applied to the capability, under a color system, of so altering existing types of receivers now in the hands of the public as to enable them to receive color pictures. (R. 147)

able that the tube is an assured fact (R. 152; Tr. 9376, 9485 (DuMont); Tr. 9922 (T. T. Goldsmith); cf. Tr. 6543, 11258, 11272-9, 11282 (Goldmark)).[15] Because a time error of only 1/11,000,000 of a second adversely affects color fidelity (see *supra*, p. 10), RCA color receivers are expected to be more complex than CBS receivers, requiring components of critical tolerance (R. 153; Tr. 9247-8, 11229-32, 11263-6 (Goldmark); cf. Tr. 8236-9 (D. B. Smith); Tr. 10866-7 (Engstrom)).

Similarly, the camera and associated equipment under the RCA system are likely to be very complex and expensive both to purchase and to maintain (R. 154; Tr. 7970 (Fink); Tr. 3213-5, 9296, 11232-3 (Goldmark); RCA Ex. 378, Tr. 11015). These difficulties are compounded in respect of camera equipment for outdoor or other remote pickups, but, in any event, RCA never demonstrated such equipment[16] (R. 154; Tr. 8100 (Fink); Tr. 11202 (Goldmark); Tr. 11480 (Lippincott); Tr. 9352 (Murphy)).

In respect of networking (viz., transmitting programs originating in one city to other cities), RCA was unable, in the earlier stages of the hearing, to transmit color over the 2.7 megacycle coaxial cable;[17] such transmissions resulted in receiving only black and white pictures (R. 154; Tr. 2718 (Engstrom)). On April 6, 1950, however, RCA simulated a color transmission over the 2.7 megacycle cable by using a special circuit which resulted in receipt of a color picture, but with reduced horizontal resolution (R.

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[15] The testimony of RCA's own witness, Dr. Engstrom, on this issue was conflicting: Compare Tr. 7847, 8595, 8597, 8599-8600 with Tr. 7849, 7921, 7925, 8587.

[16] The lack of camera equipment for remote pickups precludes any but studio programs, and hence excludes sports and many public events programs from being telecast.

[17] Television can be networked by three different means: The 2.7 megacycle coaxial cable, the 4 megacycle cable, and microwave relay. By far the greater number of cities are currently linked by 2.7 megacycle cable, but additional 4 megacycle cable and microwave relays are expected to be constructed within the next few years (Tr. 6974-7101).

154; Tr. 8140-4, 8148-9, 8150, 8152, 10877-9 (Engstrom); Tr. 11208-9 (Goldmark)). Final judgment on the feasibility of this method of networking RCA color, however, was impossible since further testing on the cable itself is required (R. 154; see Tr. 8144 (Engstrom)).

Conclusions concerning the RCA system. Based on the foregoing findings, the Commission concluded that the RCA system fell short of the minimum criteria which a color system must meet in order to be eligible for adoption (R. 159).[18] More particularly, it concluded as follows:

(1) *The color fidelity* of the RCA system is not satisfactory and it would obviously not be in the public interest to

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[18] These minimum criteria were listed as follows (R. 155-6):

"a. It [a color system] must be capable of operating within a 6 megacycle channel allocation structure.

"b. It must be capable of producing a color picture which has a high quality of color fidelity, has adequate apparent definition, has good picture texture, and is not marred by such defects as misregistration, line crawl, jitter or unduly prominent dot or other structure.

"c. The color picture must be sufficiently bright so as to permit an adequate contrast range and so as to be capable of being viewed under normal home conditions without objectionable flicker.

"d. It must be capable of operating through receiver apparatus that is simple to operate in the home, does not have critical registration or color controls, and is cheap enough in price to be available to the great mass of the American purchasing public.

"e. It must be capable of operating through apparatus at the station that is technically within the competence of trained personnel hired by a station owner who does not have an extensive research or engineering staff at his disposal and the costs of purchase, operation, and maintenance of such equipment must not be so high as unduly to restrict the class of persons who can afford to operate a television station.

"f. It must not be unduly susceptible to interference as compared with the present monochrome system.

"g. It must be capable of transmitting color programs over intercity relay facilities presently in existence or which may be developed in the foreseeable future."

The Commission expressly refused to include among its criteria the requirement that a color system be compatible (R. 156). For a discussion of the reasonableness of this judgment, see *infra*, pp. 89-96.

adopt as standard a color system which does not produce a satisfactory color picture. At none of the demonstrations on the record could RCA consistently produce pictures with adequate color fidelity. The inability to reproduce skin tones is a particularly serious handicap. Because of specified characteristics of the system or its associated apparatus "There appears to be no reasonable prospect" that the difficulties "can be overcome." (R. 159.)

(2) *The texture* of the color picture is not satisfactory as a result of misregistration, dot structure and softness arising out of the problems of maintaining contrast in small areas. "It is difficult to see how these defects can be eliminated." (R. 159-60.)

(3) *The receiving equipment* is exceedingly complex. There is no assurance that even if the tri-color tube is developed satisfactorily, and can be produced at reasonable cost, the problem of complexity and difficulty of operation will not continue. Since a time error of 1/11,000,000 of a second results in color contamination, it is difficult to see how color control can be simplified to a sufficient extent for home use. (R. 160.)

(4) *The station transmitting equipment* is also exceedingly complex. There is no assurance that satisfactory commercial equipment can be built or, if it can, that it can be maintained in proper operation by average stations. The difficulties will be particularly onerous in the case of outdoor pickup equipment which is subject to much harder use and rougher handling than studio equipment, and which RCA did not demonstrate. (R. 161.)

(5) The RCA color system is much more susceptible to certain kinds of *interference*, such as would be received from other television receivers, than the present black and white system or the CBS color system. (R. 161.)

(6) In respect of *networking*, there is no assurance that RCA color transmissions can be transmitted over the 2.7

megacycle coaxial cable facilities. However, the Commission expects the common carriers to have 4 megacycle facilities available for television "as soon as possible". (R. 161.)

(7) The RCA system has not met the requirements of successful *field testing* (R. 161-2).[19]

2. *The CBS field sequential system.* In contrast to the RCA system (R. 123), the CBS system accomplishes scanning in the same manner as the present black and white system (R. 121). However, it scans 405 lines as compared to the 525 lines of the black and white system (R. 122). It switches color at the end of each "field" so that its color switching rate is only 144 per second, as against RCA's rate of approximately 11,000,000 per second (R. 121-2; cf. R. 118-9).

The receivers used by CBS to demonstrate its system were receivers utilizing a rotating disc with colored segments, which is placed in front of the cathode-ray tube. At one demonstration, CBS also demonstrated an all-electronic projection receiver. (R. 123.) If, however, the RCA tri-color tube is successfully developed, it can be used with CBS receivers instead of the disc (R. 164).

Flicker. Large area flicker is not objectionable on the CBS disc type receiver up to highlight brightnesses of from 20 to 30 foot lamberts[20] (R. 133; Tr. 3170-1, 3177, 8956-7, 8962-4, 9249-50 (Goldmark); CBS Ex. 332, p. 11, Tr. 6393; CBS Ex. 348, Table 6c, Tr. 6741; CBS Ex. 349, Table 6b, Tr. 6741; cf. Tr. 2167 (Fink)). If tubes with "long persistence phosphors" (see *supra*, note 8, p. 8) were

[19] For testimony in support of the conclusion that RCA has not been adequately field tested, see Tr. 7962-3, 8093 (Fink); Tr. 8201-8203, 8245-6, 8249 (D. B. Smith); Tr. 9956 (T. T. Goldsmith); Tr. 9687 (Baker); Tr. 9380 (DuMont); Tr. 7451 (Jensen); cf. Tr. 3137-42, 3157 (Goldmark).

[20] A foot lambert is the unit for measuring the brightness of light reflected from a surface (R. 133).

used, the brightness could be increased several times without causing flicker (R. 133; Tr. 3100, 3171-2, 3178, 9251, 11226-8 (Goldmark)). No problem of small area flicker was observed at any of the demonstrations on the record (R. 134; see Goldmark, Tr. 3182).[21]

Brightness—contrast. The maximum brightness achieved for a CBS disc receiver at any of the demonstrations was 22 foot lamberts. The color so produced is bright enough and has sufficient contrast range to be entirely adequate for use in the home under normal viewing conditions. (R. 136; Tr. 3318-9, 3326 (demonstration); Du Mont Ex. 276; Item D2, pp. 11, 29 and 31, Conclusion No. 3, Tr. 5737; Tr. 3160-3166 (Goldmark); Tr. 9315 (Judd); Tr. 3322 (Murphy); Tr. 11226 (Goldmark); CBS Ex. 332, pp. 2, 16, Tr. 6393; CBS Ex. 348, p. 32, Tables 3a and 3b, Tr. 6741; CBS Ex. 349, p. 6, Table 3, Tr. 6741.) In any event, brightness of receivers under the CBS system can be substantially increased by the use of tubes with long persistence phosphors (*supra*, pp. 8, 16; Tr. 9573 (demonstration); Tr. 3100, 9251, 11226-8 (Goldmark)).

Registration—color breakup and fringing. Only minor registration problems exist in the CBS system because

[21] The Commission noted that if horizontal interlace (a method of transmitting signals so as to increase horizontal resolution) were utilized with the CBS system, a certain amount of small area flicker might appear, but would be minimized to an unascertainable extent by the use of tubes with long persistence phosphors (R. 134); Tr. 9229-31, 9579, 10828-9, 11271 (Goldmark); Tr. 9582, 9992 (T. T. Goldsmith)).

In this and a number of other instances, the Commission made findings concerning the possible effects of engrafting horizontal interlace upon the CBS system (see findings concerning resolution (R. 142-3), picture texture (R. 144), and susceptibility to interference (R. 145). It is to be noted, however, that while it demonstrated horizontal interlace with its system (Tr. 9575-8), CBS did not propose it for standardization, conceding that it required further development and testing (Tr. 6615, 9222-3, 9243-4, 10815-16, 10818, 10821). The standards adopted by the Commission for color transmissions did not include standards for horizontal interlace.

its apparatus uses only a single tube both at the camera and in the disc type receiver. At none of the demonstrations on the record was any evidence of misregistration observed. (R. 139); Tr. 4734, 4753 (McIntosh); Tr. 5666, 9385 (DuMont); Tr. 11478-9, 11481 (Lippincott); Tr. 9315 (Judd); Tr. 3119-20, 3135, 9298, 11200 (Goldmark).)

Color breakup[22] and color fringing[23] were observed at the demonstrations on the disc receivers; the former could be minimized by the use of tubes with long persistence phosphors (R. 139).[24]

Color fidelity. The color fidelity of the CBS system as demonstrated on the disc receiver is of a uniformly high quality (R. 140; Tr. 3753, 3757-8, 9313 (Judd); Tr. 3798, 3814 (DuBarry); Tr. 8460 (Chapin); cf. Tr. 3143, 3152, 3155, 6539, 11205 (Goldmark); CBS Ex. 332, p. 11, Tr. 6393; CBS Ex. 348, p. 4, Tables 5a and 5b, Tr. 6741; CBS Ex. 349, Table 5, Tr. 6741).[25]

Resolution. Since the CBS system produces 405 lines per picture as compared with 525 lines per picture for the present black and white system (*supra*, p. 16), there is a

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[22] Color breakup may occur when the eye moves while watching a color picture; it causes the viewer to see the separate primary colors (R. 137-8).

[23] Color fringing appears in the form of fringes along the edge of objects; it usually occurs when a rapidly moving object is televised in color (R. 138).

[24] The Commission concluded (*infra*, p. 22) that neither of these phenomena is of disturbing significance in the CBS pictures. The evidence abundantly supports this conclusion. (Tr. 3108, 3110, 3116 (Goldmark); Tr. 3331 (demonstration); Tr. 9954 (T. T. Goldsmith); Tr. 9390 (DuMont); Tr. 4259 (Sleeper); Tr. 6921 (D. B. Smith); CBS Ex. 332, p. 31, Tr. 6393; CBS Ex. 348, Table 6c, Tr. 6741; CBS Ex. 349, Table 6c, Tr. 6741.)

[25] Whether the same high quality of color fidelity can be maintained if a tri-color tube of the type developed by RCA were used with CBS receivers instead of a disc could not be determined on the record (R. 140-1).

46 per cent reduction in horizontal resolution. There is also a 23 per cent loss in vertical resolution (R. 142-3).[26] (For conclusions concerning the significance of these reductions, see *infra*, p. 22).

Picture texture—over-all picture quality. At all of the demonstrations, the CBS picture compared favorably with the present black and white system in respect of contrast, sharpness of picture and freedom from line structure (R. 144);[27] Tr. 10640 (Chapin); Tr. 6592, 6610, 11219-23 (Goldmark); FCC Ex. 388, p. 4, Tr. 8491; CBS Ex. 332, p. 22, Tr. 6393; CBS Ex. 348, p. 3, Tables 4a and 4b, Tr. 6741; CBS Ex. 349, Table 4, Tr. 6741; cf. Tr. 9386, 9458 (DuMont)).

Susceptibility to interference. The susceptibility of the CBS system to interference is substantially the same as that of the existing black and white system (R. 145); CBS Ex. 329, Tr. 6307; FCC Ex. 389 and 391, Tr. 8491; Tr. 6268-73, 6287, 6289-91, 9171 (Wright); Tr. 8455, 8457 (Chapin); Tr. 3153-4, 3494-7 (Goldmark); Tr. 8097 (Fink); RCA Ex. 369, Tables V and VI, Tr. 7829).

Adaptability; quality of black and white picture from color. The CBS system is incompatible but adaptable, since existing black and white receivers are unable to receive a black and white picture from CBS color transmissions unless the receivers are adapted by adding equipment to them or making other changes (R. 147). The costs of adapting existing sets now in the hands of the public were variously estimated at $32 to $50 by CBS witnesses (with a "somewhat lower price" if the adaptation

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[26] By utilizing horizontal interlace (*supra*, note 21, p. 17), the horizontal resolution would be approximately that of black and white, but further testing is necessary to determine whether this degree of increase can be achieved in practice (R. 143).

[27] For references supporting the finding relating to contrast, see *supra*, p. 17.

is accomplished by rewiring the circuits),[28] $75 to $100 by witnesses for the Philco Corporation, and $100 to $125 by witnesses for the Allen B. DuMont Laboratories, Inc. The Philco and DuMont estimates, however, were rejected as unreasonably high, particularly in the light of testimony that the parts used in the adaptation performed by the Commission's laboratory ranged in cost from $4 to $12. (R. 147-8.)

While the resolution of the black and white picture received from CBS color on an adapted set is less than the resolution of the standard black and white picture, the picture is nevertheless acceptable (R. 164); Tr. 6627-8 (Goldmark); CBS Ex. 348, pp. 3, 5, 7, Tables 10 and 11, Tr. 6741).

Convertibility. Existing black and white receivers can be adapted and converted to enable them to receive color transmissions in color[29] (R. 148); Tr. 3091-2, 3448 (Goldmark); Tr. 9000 (Schubert); Tr. 3685, 9139-42 (Cushway); Tr. 3734, 9147, 9154-68 (Kohner); Tr. 10778-81 (Murphy)). The retail price of such adaptation and conversion ranges from $95 to $170, depending in part on the size of the color picture to be produced by the converter (R. 148-9); Tr. 3591-2 (Mulhern); Tr. 3687, 3690, 9135 (Cushway)).

Equipment considerations. At the present time, the receivers in the CBS system are limited to projection receivers or to direct-view receivers using the disc and producing a color picture of 12½ inches without the use of a magnifier or 16 inches magnified (R. 150). According to independent manufacturers called as CBS witnesses,

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[28] A witness representing Webster-Chicago, a manufacturer, estimated that the cost of achieving adaptation of existing sets by rewiring would be one-half of the cost of achieving adaptation by installing a complete external adapter (Tr. 3687).

[29] The Commission found that some existing black and white receivers with doors or recessed tubes would, in practice, be difficult to convert (R. 148).

the retail price of a combination black and white and color receiver, using a disc, would be $200 for a 7 inch tube magnified to 10 inches, and $300 for a 10 inch tube magnified to 12½ inches. DuMont testified that a combination black and white and color set with a 12 inch tube (unmagnified) would retail at $500-$600 as compared with $329 for a DuMont black and white set of similar quality. (R. 150-1.)

The CBS disc type receiver, and operation thereof, are relatively simple; the color control is not critical (R. 151); Tr. 3217-8, 3220, 6561-2, 11231-2 (Goldmark); Tr. 8460 (Chapin); Tr. 3667 (Hamilton); Tr. 3592 (Mulhern)). Since the standards of transmissions for black and white and for CBS color are different, and the receiver must be switched to change from one to the other when desired, broadcasters cannot readily change from black and white to CBS color, or vice versa, during the course of a program (R. 151-2).

The camera and associated equipment used with the CBS system involve no critical controls and CBS successfully demonstrated outdoor pickups (R. 152).

In respect of networking, CBS color pictures can be transmitted over 2.7 megacycle coaxial cable (R. 152).

Conclusions concerning the CBS system. On the basis of the foregoing findings concerning the CBS system, the Commission concluded that the CBS system met all of the criteria for a satisfactory color system[30] (R. 414-15); see also R. 166). Specifically, it concluded in its First Report as follows:

(1) The CBS system produces a color picture which is most satisfactory from the point of view of *texture, color fidelity* and *contrast*. The demonstrations included a wide variety of subject matter both in the studio and outdoors

[30] See *supra*, note 18, p. 14 for the criteria established by the Commission.

and the picture produced in each case was entirely suitable for home viewing purposes. (R. 163.)

(2) *Receivers* and *station equipment* are simple to handle and have been subjected to use in widely diversified circumstances without difficulty. The receivers are simple and when produced on a mass marketing basis, should be within the economic reach of the great mass of the purchasing public. (R. 163.)

(3) While the CBS system has greater susceptibility to *flicker* than the present black and white system, the brightnesses achieved on disc receivers are adequate for home use; further, long persistence phosphors used on non-disc receivers provided a specific method of increasing brightness with no objectionable flicker (R. 163).

(4) The susceptibility of the CBS system to *color fringing* and *color breakup* in certain circumstances is not a serious obstacle since the defects are not obtrusive, they occur infrequently, and they can be minimized by programming techniques (R. 163).

(5) The loss of geometric *resolution* in the CBS system is "more than ouweigh[ed]" by the addition of color, as far as apparent definition is concerned (R. 163-4).[31]

(6) The CBS system was, at the time of the decision, limited as a practical matter, to projection receivers or direct view receivers of a maximum of 12½ inches (capable of being magnified to 16 inches). The tri-color tube demonstrated by RCA is not limited in picture size and can be utilized with the CBS system, thus providing a method whereby the CBS receivers can be freed of picture size

[31] See Tr. 4184-7, 4011, 6603, 6610, 6627, 6635-7, 8893-5 (Goldmark); Tr. 9315 (Judd); Tr. 10640 (Chapin); FCC Ex. 388, p. 4, Tr. 8491; CBS Ex. 332, p. 22, Tr. 6393; CBS Ex. 348, p. 3, Tables 4a and 4b, Tr. 6741; CBS Ex. 349, Table 4, Tr. 6741; cf. Tr. 9458 (DuMont). For testimony establishing that color adds considerably to apparent definition, see Tr. 4287 (Sleeper); Tr. 4743 (McIntosh); Tr. 6138 (Engstrom). See *infra*, pp. 80-82.

limitations.[32] However, since the RCA demonstration of its tube with its system revealed various defects in the tube as it then existed, the Commission was unable to conclude that the tube had been successfully developed. In addition, there was no demonstration of a direct view tri-color tube on the CBS system. Accordingly, there was no definitive answer in respect of whether direct view tubes larger than 12½ inches are possible with the CBS system. (R. 164.)[33]

D. *The Commission's conclusions concerning postponement of the adoption of standards.* Despite the foregoing findings and conclusions that the addition of color was a fundamental improvement in television, that the RCA and the CTI systems failed in important respects to meet the minimum criteria for the adoption of a color system, and that the CBS system was satisfactory and suitable for immediate adoption (R. 166), the Commission did not adopt standards for the CBS system at the time of its First Report.

Instead, the Commission postponed adoption of such standards on the ground that the record disclosed further possibilities for the development of the CBS system, or apparatus associated with it, which the Commission desired to take time to explore if the public interest were not adversely affected by the postponement of a final decision (R. 164-6). These potential improvements involved (1) the use of a tri-color tube, such as that demonstrated by RCA, with the CBS system as a means of freeing it from direct view picture size limitations (*supra*, pp. 20-21); (2) the addition of horizontal interlace as a means of increasing horizontal resolution (*supra*, note 26, p. 19); and (3) the use of long persistence phosphors on tubes so as to

[32] The use of a tri-color tube in CBS receivers would dispense with the need for the disc, which is responsible for the picture-size limitation on direct view receivers.

[33] For additional conclusions, embodied in the Second Report, relating to the question of CBS picture size, see *infra*, p. 29.

increase brightness potentiality without flicker (*supra*, pp. 16-17). The Commission noted that none of these developments had yet been fully proven or tested or sufficiently demonstrated and that if either horizontal interlace or long persistence phosphors were successfully developed, they might justify changes in, or additions to, existing black and white television standards as well as the proposed CBS color standards[34] (R. 165).

In addition to these three matters, the Commission also noted (R. 165-6) that there was "the possibility" of new color systems and improvements in exising color systems which had been informally called to its attention since the hearings had closed. It stated that since these matters relating to new systems and improvements were not of record, they could not be relied on in reaching a decision without reopening the record.

The Commission stated, however, that despite the advantages of postponing adoption of standards for the CBS color system in order to await the outcome of further developments or testing in respect of the foregoing four matters, there was an important counterbalancing disadvantage. This disadvantage arose from the fact of the incompatibility of the CBS system. Because of this fact, delay in adopting standards for the CBS system—a system which the Commission found to be satisfactory—would aggravate the problem of incompatibility by increasing the number of black and white receivers in the hands of the public and hence currently incapable of receiving the color signals under the CBS standards.[35] (R. 165-6.) As the Commis-

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[34] The changes would be with respect to the field and line repetition rate in transmission (R. 165-6). These changes in transmission standards would involve correlative changes in receivers so that they would be capable of handling the different synchronizing rates (R. 166-7).

[35] In this connection, it is also to be noted that the Commission found (R. 147-8) that the cost of building the necessary additional circuits into a new receiver at the factory to permit it to receive CBS color transmissions in black and white (i. e. "internal

sion found (R. 166), the problem of postponement was grave since

> "eventually the mere passage of time overpowers the incompatible system by the sheer weight of receivers in the hands of the public."

The Commission further noted that "one of the easiest methods of defeating an incompatible system is to keep on devising new compatible systems in the hope that each new one will mean a lengthy hearing . . ." (R. 166). Postponement of adoption of the CBS system, therefore, would mean that if, after such postponement, the claimed new or improved compatible systems would still prove to be unsatisfactory,—and they had been found to have inherent defects which made satisfactory development doubtful—adoption of the only known and proven satisfactory system might be impracticable because of the greatly increased number of receivers in the hands of the public which would require adaptation or conversion. Delay thus might result in a serious obstacle to making color television available to the public at all. (R. 165-6.)

Thus the Commission was faced, as it stated, with these two "difficult courses" of action (R. 164-5)—immediate adoption of CBS standards, on the one hand, without an opportunity to explore the four matters specified, and postponement of such adoption, on the other hand, with the attendant injury to the public arising out of the re-

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adaptation") is "substantially lower" than the cost of external adaptation of existing receivers in the hands of the public. RCA itself estimated the cost of internal adaptation for manual switching at $7 to $10, and $20 to $24 for automatic switching (Tr. 8558, 10048-9, 10091; RMA Ex. 408, pp. 29-30, Tr. 9617). The cost of $7-$10 for internal adaptation estimated by RCA should be compared with the estimates by manufacturers called by CBS of $32-$50 for external adaptation (*supra*, pp. 19-20). Thus obviously a delay in adopting CBS standards would, since it involves a delay in producing internally adapted sets, increase the costs to the consumer by the difference in cost between internal adaptation and external adaptation. See *infra*, pp. 140-142.

sulting growth of the problem of incompatibility. It sought to resolve the dilemma by deciding to delay final adoption of the satisfactory CBS systems if a way could be found to prevent the interim aggravation of the problems arising out of incompatibility. If no method could be devised to accomplish this purpose, the Commission stated, "the CBS color system should now be adopted." (R. 166.)

The Commission, accordingly, suggested as a method of confining the compatibility problem, and hence permitting time for further exploration of the new developments, the adoption of new standards for transmitting *black and white* television signals. The suggested new standards would be "bracket standards"—that is, existing black and white transmission standards would be amended so as to encompass a range of "lines" and "fields". Such new standards would include a range of such lines and fields which would permit receivers built to accept such a range to receive the present black and white transmissions and the proposed CBS color transmissions in black and white. They would, in addition, permit reception on such newly built receivers of transmissions under black and white standards as they might be amended within the range in the future and CBS color standards as they might be similarly amended, to the extent that such future amendments might be justified by developments in respect of long persistence phosphors and horizontal interlace. The Commission stated that if (1) it proved feasible promptly to adopt such bracket standards for black and white transmissions, and (2) manufacturers of television receivers would advise the Commission that they would promptly build black and white receivers capable of receiving the new range of standards, then the Commission could, consistently with the public interest, postpone final decision for a specified time, because the new black and white receivers would, without further change, be able to receive not only black and white signals either

in their present form or as amended but also the CBS color signals in black and white. Since, therefore, all new receivers would be compatible, a cut-off for the problem of incompatibility would be achieved. (R. 166-8.)

The Commission expressly stated (R. 168), however, that if bracket standards could not be adopted promptly, or if assurances were not received from a sufficient number of manufacturers that they planned promptly to incorporate bracket standards in their receivers,—

> the Commission will not feel free to postpone a decision, for every day that passes would aggravate the compatibility problem. In that event, a final decision would be issued adopting the CBS color standards.[36]

Accordingly, concurrently with the First Report, the Commission issued a Second Notice of Further Proposed Rule Making (R. 288) proposing the adoption of bracket standards and inviting comment, including alternative suggestions, from all interested persons. On or about September 29, 1950, thirty-three comments were received. In general, they expressed opposition to the adoption of bracket standards and indicated that the television receiver manufacturers either could not or would not manufacture receivers capable of receiving transmissions under the bracket standards within the time proposed by the Commission. No alternative suggestions for dealing with the

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[36] Commissioners Hyde (R. 188) and Jones (R. 193) disagreed with the majority in that they believed that standards for the CBS system should have been adopted forthwith and without the delay suggested by the majority. Commissioner Hennock filed "separate views", stating that the postponement of adoption of the CBS standards to permit further experimentation under certain conditions was for too short a time and should be extended to June 30, 1951 (R. 190). She explicitly stated, however, that if sufficient assurances were not received from manufacturers that bracket standards would be built with receivers thereafter produced, "I would adopt field sequential color standards" (R. 190). She also noted her agreement with her colleagues "in their evaluation of the present state of the relative development of the various proposed systems" (R. 193).

containment of the problem of compatibility were advanced in any of the comments. (R. 416).

On October 4, 1950, RCA filed a petition (R. 408) requesting that the Commission review, between December 5, 1950, and January 5, 1951, claimed improvements in the performances of its system, and that before reaching a final determination, the Commission view, during the period to June 30, 1951, further experimental broadcasts of the three proposed and any new color systems.

E. *The Second Report.* On October 10, 1950, the Commission issued its Second Report (R. 413). It noted that the comments which it had received established that bracket standards could not be promptly adopted and "bracket standard" receivers would not be promptly made; further, it noted that the manufacturers had not suggested any other method of maintaining the status quo in respect of compatibility if a decision were postponed (R. 416). Since it appeared, therefore, that there was no way of containing the compatibility problem, the Commission concluded (R. 416) that—

> . . . we would be derelict in our responsibility to the public if we postponed a decision any longer. With no way of preventing the growth of incompatibility, the longer we wait before arriving at a final decision the greater the number of receivers in the hands of the public that will have to be adapted or converted if at a later date the CBS color system is adopted.

Further, the Commission stated (R. 415) that by delay, the Commission

> would be in the position of inviting the risk that if, after postponing a decision, the compatible color systems should again fail to meet the minimum criteria for a color system, as they have failed in the past, the number of receivers in the hands of the public would have increased to such a point where, as a practical matter, it might not be practicable to adopt an incompatible color system even though we now know that such system meets all the criteria for a color system.

After thus explicitly concluding that even without the possible new developments, the CBS system and apparatus as actually demonstrated met all the criteria for the adoption of a color system, the Commission reviewed the four factors which had prompted it to seek a means of postponement without increasing incompatibility, and it reaffirmed its conclusion in the First Report that, absent a means of containing the compatibility problem, none of the factors was such as to warrant postponement.

Thus, in respect of awaiting further development of a tri-color tube in order to determine definitively whether the CBS direct view receivers could thereby be freed of the limitation to 12½ inch size, the Commission concluded that the public might well prefer a 12½ inch direct view color picture to a larger size black and white picture,[37] and that in any event, adoption of CBS standards would furnish a "healthy incentive" to develop a means—either a tri-color tube or some other apparatus[38]—of producing larger size direct view color pictures (R. 418).

In respect of horizontal interlace, the Commission had already concluded (R. 163-4, 415) that while the CBS system has less geometric resolution than the present black and white system, "the addition of color more than outweighs the loss in geometric resolution so far as apparent definition is concerned." It further noted that in any event, if the technique of horizontal interlace is successfully developed in the future for use with the CBS sys-

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[37] For testimony indicating such a preference, see CBS Ex. 332, pp. 3, 23-25, Tr. 6393. Similarly Dr. Engstrom, RCA's vice-president in charge of research (Tr. 2648), testified that he was uncertain whether a limitation of picture size was basic in inaugurating a color television service (Tr. 10892). Commissioner Sterling, however, dissented from the Commission's conclusion in respect of CBS picture size (R. 429).

[38] Development of receiver apparatus capable of producing direct view pictures larger than 12½ inches under the CBS system would not involve a change in the system itself or in the standards adopted by the Commission, nor, when perfected and produced, would it obsolete disc receivers then in the hands of the public.

tem, it can be added without affecting receivers then in the hands of the public (R. 418-9).

Similarly, in respect of long persistence phosphors, the Commission had concluded that the CBS system had met the criteria in respect of brightness-flicker characteristics (*supra*, pp. 16-17, 22) and it noted that, in any event, such phosphors, if and when developed, could be utilized in receivers made after such development so as to increase the brightness potential without flicker; this, however, is a matter only of improved equipment which would not make obsolete or affect the utility of the already satisfactory equipment sold after the adoption of CBS standards and before the perfection of such phosphors[39] (R. 419).

In respect of the possibility of new or improved compatible systems, the Commission stated (R. 419) that such developments were not entitled to a hearing or a reopening of a hearing "simply on the basis of a paper presentation." Because it is "a long step" from description of theoretical systems on paper and "successful operation", there can be "no assurance that a system is going to work until the apparatus has been built and has been tested." (R. 419.) The Commission concluded (R. 419-20), therefore that

> None of the new systems or improvements in systems meet these tests so as to warrant reopening of the hearing. To do so would be inviting the risk that these new systems might fail as have all color systems in the past which we have been urged to adopt on the grounds of compatibility and the increase in number of receivers in the hands of the public would make it exceedingly difficult to adopt an incompatible system—a system which we know is satisfactory.

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[39] In respect of the future development of both horizontal interlace (R. 418-9) and long persistence phosphors (R. 419), the Commission did say that because it was unable to adopt bracket standards, it would be possible to take advantage of such development only through the use of improved equipment rather than by making such changes in standards (lines and field rates) as the developments might justify in the future.

The Commission did, however, explicitly leave the door open for the future consideration, upon a proper showing, of new and improved systems (R. 420; see R. 169).

Simultaneously with its Second Report, the Commission issued orders (1) denying the RCA petition of October 4, 1950, to postpone a final determination (R. 410),[40] and (2) amending the Commission's standards of Good Engineering Practice to permit the regular non-experimental transmission of color television in accordance with the field sequential standards[41] (R. 432).

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[40] In its unanimous order denying the RCA petition, the Commission noted (R. 410-11) that there had been extensive proceedings, that in its First Report, it had specified the terms and conditions under which it might consider reopening the record, and that

> . . . petitioner has had a full and fair opportunity to present its proposals to the Commission; that the state of the television art is such that the new ideas and new inventions are matters of weekly, even daily occurrence; that the question of approving a color television system which will best serve the interests of the American people is one which has been before the Commission for almost 10 years; that in all proceedings such as the instant one a point is reached which calls for administrative finality with respect to the Commission's hearing processes; and that in the sound discretion of the Commission a delay in reaching a determination with respect to the adoption of standards for a color television service as requested in the instant petition would not be conducive to the orderly and expeditious dispatch of the Commission's business and would not best serve the ends of justice; . . .

[41] Commissioner Sterling (R. 421) and Hennock (R. 429) dissented from the Second Report and the order amending the standards of Good Engineering Practice. Commissioner Sterling stated that further time should have been permitted to explore the adoption of bracket standards, and that a conference should have been held with the manufacturing industry to agree on a "realistic time table". He stated, however, that if this procedure should not result in a "practical solution" to contain the compatibility problem, "I would then join the majority in authorizing the field sequential system." Commissioner Hennock dissented on the ground that compatibility was so desirable that final decision should be postponed until June 30, 1951, to provide further opportunity for developing such a system. She agreed, however, that if steps could not be taken within 90 days to arrest the growth of incompatibility by the adoption of bracket standards or some other means, standards for the field sequential system should then be immediately adopted.

SUMMARY OF ARGUMENT.

I.

The order of the Commission, adopting the field sequential system as a standard for color television broadcasting, is based upon extensive, comprehensive and detailed evidentiary and ultimate findings of fact fully set out in the two reports of the Commission. The determinations of policy which were involved in reaching the conclusion that the field sequential system was satisfactory, and that the dot sequential system was not, were fully articulated in a manner which discloses that they are reasonable judgments within the scope of the Commission's statutory authority and the area of its discretion to make quasi-legislative judgments in the public interest. Indeed in the light of the complicated nature of the subject matter, the fullness with which the technical and policy issues presented were comprehensively explored in a hearing on the record, and the care with which the findings and conclusions based on that record have been set out, this appeal presents the classic case for judicial non-intervention in the absence of clearly arbitrary action or other departure from the ambit of authority conferred on the agency by Congress. See, e.g., *American Telephone and Telegraph Company* v. *United States*, 299 U. S. 232, 236-237; *National Broadcasting Company* v. *United States*, 319 U. S. 190.

Although it is believed that the provisions of Section 10(e) of the Administrative Procedure Act are not intended to work a revision of the well-settled limitation on the judicial power to review quasi-legislative determinations of the type here involved, it is unnecessary to resolve that question here. For even if the applicable scope of review be that the order must be supported by "substantial evidence on the whole record", the Commission's findings are clearly so supported.

A. The Commission made detailed findings of fact reflecting consideration of all the evidence, favorable and un-

favorable, with respect to the performance characteristics of the dot sequential system and the field sequential systems. On the basis of these findings, the Commission concluded in its First Report that the field sequential system met the criteria for a satisfactory system and that the dot sequential system did not. Appellants' claim that the findings adverse to the RCA system were based on evidence taken in earlier portions of the hearing which had been superseded by later development is discredited by the Commission's findings, which plainly reflect consideration of all testimony and demonstrations on the record down to its closing. And the record itself discloses ample evidence in the latter phases of the hearing held in 1950 in support of the Commission's findings and conclusions. Similarly, appellants' claim that the Commission adopted the field sequential system in the face of its own recognition that further information was required with respect to its performance characteristics ignores specific findings of the Commission in its Final Report that the field sequential system, in its present state of development, is suitable for adoption.

B. The Commission's choice of criteria and the weight which it gave the various relative factors in determining whether a color system was suitable for adoption were wholly reasonable. Appellants' contentions that the Commission should have selected other criteria and should have made other evaluations amount to no more than a quarrel with the Commission's judgment on matters committed to it for decision by Congress. Appellants advance no considerations which are not adequately dealt with in the Commission's reports. The reports reflect a thoughtful consideration of all relevant issues of policy and a resolution of these issues in a manner which is plainly not unreasonable.

Appellants' contention that the Commission's criteria reflected inadequate consideration of the factors of resolution, picture size, and flicker-brightness relationship, is discredited by the findings and conclusions of the Commission.

There is ample support in the record for the Commission's conclusion that geometric resolution should not be treated as a separate criterion, but should be treated as one of many factors making up the composite factor of over-all definition or apparent definition. Similarly, there is ample evidence in the record to support the Commission's refusal to insist, as a condition on adopting a color system, that receiver apparatus must be able to produce direct-view pictures in excess of 12½ inches. And with respect to flicker-brightness relationship, the record affords complete support for the Commission's conclusion that the CBS system met the criterion of adequate brightness without objectionable flicker. The claim that the Commission erroneously failed to include among its criteria the factor of "channel utilization" ignores the fact that in evaluating the systems and the relevant evidence, the Commission was dealing with the very issue which appellants contend it omitted, for obviously that system which best meets the criteria which the Commission did enunciate also most effectively utilizes the spectrum space.

The Commission properly refused to accede to appellants' claim that the Commission should adopt only a system which is compatible, i.e., the color transmissions of which can be received on existing black and white sets as a black and white picture. The Commission gave the fullest consideration to this question, and decided that while compatibility was a desirable feature if it could be achieved in a system which also gave a satisfactory color picture, in fact no such system had been produced. The Commission concluded that on the basis of the record in this proceeding and its prior experience, compatibility is too high a price to put on color, since it had resulted in, and bore little promise of avoiding, excessive complexity or unsatisfactory pictures or both. This reasoned determination of the Commission, involving a host of factors hinging on both present performance and expert judgments concerning the future, is the very type of judgment which the Commission was particularly established by Congress to make. And its decision to adopt color television standards which are in-

compatible with present black and white television standards is wholly consistent with principles previously enunciated by the Commission.

C. The Commission's consideration of the possibility of delaying final decision for the purpose of securing information concerning further developments in color television if it were possible to do so without aggravating the compatibility problem was reasonable and involved no illegality. The Commission expressly recognized that the possible improvements which it had under consideration were not indispensable prerequisites to the adoption of the field sequential system and felt that time should be given for the exploration of those possibilities only if some way could be devised for avoiding the aggravation of the compatibility problem. The proposal for the adoption of bracket standards was offered as such a means. It was not a proposal to compel adoption of bracket standards without a hearing or to regulate the manufacture of receivers. It was, rather, an entirely reasonable action of the Commission in seeking information in order to ascertain whether delay in the adoption of CBS standards would be possible without grave injury to the public interest.

D. The Commission properly refused to adopt transmission standards permitting regular broadcasting under the RCA system as well as under the CBS system. Since it had found that the RCA system did not meet the criteria for a satisfactory color system, the Commission did not properly have before it the question whether it should also authorize standards for that system, as well as the CBS system which it had found to be satisfactory.

1. Sections 303(b) and (e) confer on the Commission ample authority to set engineering standards for broadcast transmission. Its authority must be exercised in conformity with the criterion of the "public interest, convenience and necessity." The legislative history makes it plain that the effect of transmission standards on the type of equipment which must be used by the public in order to receive a given service is a matter which the Commission may consider. The consistent practice of the Commission, both

before and since the enactment of the Communications Act, has been to authorize only a single set of standards for a given service.

Appellants claim that no injury to the public would be inflicted by authorizing standards for its system as well as the field sequential system. But that contention is at odds with the explicit findings of the Commission not only that appellants' system gave an unsatisfactory color picture, but also that the black and white picture it produced was inferior to that transmitted under existing black and white standards, and that the system was susceptible to additional interference. Hence authorization of such a system would injure the viewing public by inducing the purchase of receivers designed to receive signals of a system incapable of producing satisfactory pictures and divert broadcasters to investments in a defective color system.

2. Appellants are also mistaken in their contention that adoption of a single set of standards for color is forbidden because it fosters monopoly and therefore transgresses the policy of the Communications Act to establish the maximum possible competition. That argument ignores the nature of the subject matter, which requires adoption of standards, and the nature of the competition which the Commission is under an affirmative duty to promote. The type of competition which is calculated to achieve the objective of maximum utilization of frequencies in the public interest is not regulated competition of superior and inferior means of transmission, but, rather, competition between licensees using authorized and standardized means of transmission for the attention of the listening and viewing public.

3. Since the Commission properly decided that the dot sequential system was unsatisfactory, it was not presented with the question whether, if that system were otherwise satisfactory, it, as well as the field sequential system, should be adopted. Therefore, the Commission was not required to make findings on the issue of multiple standards. In fact, the contention that the Commission should have authorized multiple standards is an afterthought. In the

proceedings before the Commission, appellants' position was that its system alone should be adopted. No alternative was formally proposed and there was substantially no dispute before the Commission that single standards were to be preferred.

E. The court below properly sustained the Commission's order. It specifically considered in its opinion every substantial attack made by the appellants on the validity of the Commission's order. Guided by the well-established principle that the power of a court reviewing administrative rule-making is stringently confined, the court below rejected appellants' contentions that the Commission's order was erroneous as a matter of fact and as a matter of policy.

If the court below rested its conclusion that the case should not be remanded to the Commission for further proceedings in the light of allegedly new developments partly on the ground that its power to do so was doubtful and that the finality of decision by this Court was sorely needed in this case, it was not in error in so doing. The doubts of the court below as to its power to remand on that ground are clearly confirmed by decisions of this Court to the effect that it is not for the courts, short of a showing of a clear abuse of discretion, which was certainly not made here, to decide whether an administrative record has become so stale as to require further consideration in the public interest. See *United States* v. *Pierce Auto Lines*, 327 U. S. 515, 535; *Interstate Commerce Commission* v. *Jersey City*, 322 U. S. 503. Particularly when, as here, the public interest as found by the Commission would be gravely injured by delaying the effectiveness of the Commission's order, remand for futher consideration of this question would not only be an empty gesture but a distinct disservice to the public.

II.

A. The Commission properly refused to base any determination on *ex parte* consideration of material outside the record and properly failed to reopen the record on the

basis of such material. Consideration of RCA's so-called "Progress Report" on an *ex parte* basis would have substantially negated the Commission's deliberate choice of submitting all the evidence and opinion on the color television issue to the exacting crucible of the open hearing, sworn testimony, the personal appearance of witnesses, and cross-examination. In any event, this report contained nothing with respect to those features of the RCA system which the Commission had found to be fatally defective and probably inherent in the system, which justified consideration as anything more than the assertion of unsupported claims of a type which had been made by RCA prior to the hearings and during its course.

The Commission clearly did not abuse its discretion in refusing to rely, without reopening the record, on the Condon Committee Report as a basis for its decision. That report had been prepared at the request of the Chairman of the Senate Committee on Interstate and Foreign Commerce and was intended to advise him concerning the status of color television. It was made on the basis of limited testimony and demonstrations on the record before the Commission, and it referred to no new evidence relating to the systems under consideration by the Commission.

In the light of the contents of both these reports, and appellants' failure to make any clear request that the Commission reopen the record for their consideration, it is clear that the Commission did not abuse its discretion in failing to do so on its own motion.

B. The Commission also properly exercised its discretion in denying the RCA petition of October 4, 1950, to postpone the making of a final decision. That petition contained nothing definitive which had not already been before the Commission. It made no specific or significant claims of present achievement and it made no offer of proof. It did not ask the Commission to examine the system at that time but requested only that the issues be held open for nine months, at the end of which time the petition promised a system which would be ready for adoption. As the Commission noted in denying this petition, RCA had had a full

opportunity to present its evidence during the lengthy hearings and, especially in the field of electronics where there are constant developments, there must be a stopping point somewhere. The granting of the petition for delay would have resulted in grave injury to the public, for if ultimately the RCA system still proved inherently defective, as the Commission found likely, the public interest would be adversely affected by aggravation of the problem of incompatibility, resulting either in a large economic cost to the public at the least or the indefinite deprivation of color television at the most. In these circumstances, the refusal of the Commission to postpone decision was clearly reasonable.

C. The participation in the proceedings of Chapin, a Commission staff engineer, was proper and did not vitiate the Commission's order. Chapin had no financial interest in the device, since he had executed an assignment to the Government, and he had nothing else at stake. There having been no showing of bias on the part of the Commission, the objection to Chapin's participation, characterized by appellants before the Commission as "a matter of appearance more than anything else", cannot, under the decisions of this Court void the Commission's order. *Champlin Refining Co.* v. *Commission*, 286 U. S. 210, 236; *United States* v. *Morgan*, 313 U. S. 409, 421.

III.

The subpoenas requested by Pilot Radio Corporation for the production of correspondence between the Chairman of the Interstate and Foreign Commerce Committee and the Commission or any of its members, and officials of CBS, were properly quashed by the court below since they were not relevant to any allegation made in either Pilot's complaint or its motion to intervene as plaintiff. Moreover, the request was frivolous, since in the absence of a substantial showing of improper conduct—and none was made here—courts will not go behind the record to probe into the mental processes by which administrative determinations are made.

ARGUMENT.

I.

THE COMMISSION'S ORDER WAS REASONABLE AND THE COURT BELOW PROPERLY SO FOUND.

Introduction.—As appears from the Statement, *supra*, pp. 3-31, the Commission unanimously made extensive, comprehensive, and detailed evidentiary and ultimate findings of fact relating, *inter alia*, to the respective merits and deficiencies in the performance of the CBS and RCA color systems.[42] These findings were the product of a painstaking analysis of the technical features and performance characteristics of the systems. They were based not only on a critical analysis of the theoretical principles upon which each system was founded, and of the 10,000 pages of testimony and 265 exhibits, but also upon the actual viewing by the Commissioners themselves of demonstrations on the record, including comparative demonstrations, of the performance of the systems.

In these circumstances, and whatever the proper scope of judicial review in a case such as this, the appellants would have an exceedingly heavy burden to bear in attempting to establish the unreasonableness of the Commission's determinations or the invalidity of its findings of fact. But that burden becomes even greater when, as here, the administrative order under attack is the product of a rule-making proceeding—primarily a legislative and not an adjudicatory process.

For the invalidity of such an order can be established only on a showing that it bears no reasonable relation—in fact or as a policy matter—to the statutory duty of the

[42] While Commissioner Sterling, in his dissent from the Commission's Second Report (R. 421), expressed his disagreement with the majority belief that the public might prefer smaller color pictures to larger black and white, he had no disagreement with the majority as to the relative merits of the RCA and CBS systems.

Commission to regulate transmission standards and apparatus (Section 303(b) and (e) in particular) and the statutory objective of encouraging "the larger and more effective use of radio in the public interest." Section 303(g) of the Communications Act of 1934, Appendix A, *infra*, p. 154. The scope of the issue concerning reasonableness is narrow. The judicial inquiry is at an end if there is found a rational relation of the regulation to the statute, and to the ends sought to be achieved; the question is whether the particular alternative which the Commission selected among many alternatives to achieve the objectives of the Act is one which, in the circumstances, a rational person could have chosen. Cf. *Final Report of the Attorney General's Committee on Administrative Procedure*, S. Doc. 8, 77th Cong., 1st Sess., pp. 116, 117, 119. Only if the regulations are unreasonable, arbitrary, or capricious will they be set aside. *American Telephone and Telegraph Co.* v. *United States*, 299 U. S. 232, 236-237; *National Broadcasting Co.* v. *United States*, 319 U. S. 190; *Pacific States Box & Basket Co.* v. *White*, 296 U. S. 176, 182; *Chicago, R. I. & P. Ry.* v. *United States*, 284 U. S. 80, 95-96; *Houston* v. *St. Louis Independent Packing Co.*, 249 U. S. 479, 484, 487.[43] And the doctrine of administrative finality applies with especial force when, as here, the judgments involved in promulgating regulations are necessarily prospective. Cf. *Railroad Commission of Texas* v. *Rowan & Nichols Co.*, 310 U. S. 573, 581; 311 U. S. 570, 575, 577.[44] Here the issues before the Commission were

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[43] Indeed, in passing upon the validity of administrative regulations, this Court has even invoked a presumption of the existence of facts to support the regulations. *Pacific States Box & Basket Co.* v. *White*, 296 U. S. 176; *United States* v. *Rock Royal Co-operative*, 307 U. S. 533, 567-568; *St. Joseph Stock Yards Co.* v. *United States*, 298 U. S. 38, 83 (Brandeis, J., concurring).

[44] Cases in which administrative "rule-making" regulations were reviewed to determine whether there was "substantial evidence" to support the findings of fact were cases, unlike this, in which the statute specifically prescribed that scope of review. See, e. g., *Federal Security Administrator* v. *Quaker Oats Co.*, 318 U. S. 218, 228; *Opp Cotton Mills* v. *Administrator*, 312 U. S. 126, 156.

difficult and complex, involving the formulation of highly technical rules which operate *in futuro*. It is precisely for these reasons that its decision, once made and passed from the administrative to the judicial process, presents the classic case for judicial non-intervention in the absence of clearly arbitrary action or other departure from the ambit of authority conferred on the agency by Congress.

Although we believe that even its most stringent standards were fully satisfied, it is to be doubted that the Administrative Procedure Act works a revision of this well-settled limitation on the judicial power to review quasi-legislative determinations of the type here involved. Cf. *Universal Camera Corporation* v. *National Labor Relations Board*, No. 40, this Term (quasi-judicial administrative determination). Section 10(e) of that Act (60 Stat. 243, 5 U.S.C. 1009, Appendix A, *infra*, p. 155) provides that

> So far as necessary to decision and where presented the reviewing court shall decide all relevant questions of law, interpret constitutional and statutory provisions, and determine the meaning or applicability of the terms of any agency action. It shall * * * (B) hold unlawful and set aside agency action, findings, and conclusions found to be (1) arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law * * *.

This standard—whether the action is "arbitrary, capricious [or] an abuse of discretion"—would seem to be the same as the standard of reasonableness established by the many decisions cited above. And it is this standard, described in Section 10(e)'s first category, which would seem applicable to the factual and policy determinations made by the Commission in this case. For, postponing discussion of the fifth category for a moment, the rest of the categories described in Section 10(e) seem clearly inapplicable to the factual and policy questions covered by this Point in our Argument: the second category relates to constitutional issues, the third to statutory issues, the fourth

to procedural issues, and the sixth to issues of fact triable *de novo*.[45]

The fifth category in Section 10(e) contains the only mention of the "substantial evidence" test. It directs a court to set aside agency action found to be

> (5) unsupported by substantial evidence in any case subject to the requirements of sections 7 and 8 or otherwise reviewed on the record of an agency hearing provided by statute; * * *.

The Commission proceedings here involved were not subject to the requirements of Sections 7 and 8 because, under Section 4(b) of the Administrative Procedure Act (Appendix A, *infra*, pp. 154-155), Sections 7 and 8 apply to rule-making proceedings only "Where rules are required by statute to be made on the record after opportunity for an agency hearing", and the Communications Act of 1934 contains no requirement that rules be so made.[46]

Nor is this a case "otherwise reviewed on the record of an agency hearing provided by statute," within the mean-

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[45] After that part of Section 10(e) quoted in the text, the Section goes on as follows:

> * * * (2) contrary to constitutional right, power, privilege, or immunity; (3) in excess of statutory jurisdiction, authority, or limitations, or short of statutory right; (4) without observance of procedure required by law; (5) unsupported by substantial evidence in any case subject to the requirements of sections 7 and 8 or otherwise reviewed on the record of an agency hearing provided by statute; or (6) unwarranted by the facts to the extent that the facts are subject to trial de novo by the reviewing court. In making the foregoing determinations the court shall review the whole record or such portions thereof as may be cited by any party, and due account shall be taken of the rule of prejudicial error.

[46] Section 4(b) of the Administrative Procedure Act, applicable to rule-making, "does not extend present requirements [as to hearings] except to require agencies, in the issuance of substantive rules, to permit at least the submission of written views or suggestions." Explanation in Senate Judiciary Committee Print of the Administrative Procedure Act, in Sen. Doc. No. 248, 79th Cong., 2d Sess., p. 19.

ing of Section 10(e)(B) (5) of the Administrative Procedure Act since, as noted, the Communications Act provides for no agency hearing in "rule making"[47] and the legislative history of the Administrative Procedure Act makes clear that the "fifth category [in Section 10(e)(B)] necessarily limits the substantial evidence rule to cases in which Congress has required an administrative hearing in which the administrative record may be made." Explanation in Senate Judiciary Committee Print of the Administrative Procedure Act, Sen. Doc. No. 248, 79th Cong., 2d Sess., p. 39.[48] Nor does the Constitution require a hearing in an administrative rule-making proceeding of the type here involved; consequently such a requirement need not be read into the Communications Act. Cf. *Wong Yang Sung* v. *McGrath*, 339 U. S. 33.

It would thus seem that the "substantial evidence" rule is inapplicable to the factual determinations here made by the Commission. But whether it is or not is of no great consequence in this case, since the Commission's findings of fact are in any event supported by "substantial evidence on the whole record" and, hence, decisive.

It is not to be forgotten, too, that, factual determinations aside, under the long line of cases above cited as typical of many others, the Commission's policy judgments must stand if they are not arbitrary, and there is no doubt that this rule remains unchanged by the Administrative Procedure Act.

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[47] Where Congress intended the Commission to hold a hearing prior to action, it specifically so provided in the Act. See Section 303(f).

[48] This explanation was directed at the bill at a time when Section 10(e)(B)(5) was limited to cases required to be heard in accordance with Sections 7 and 8. When Section 10(e)(B)(5) was expanded to its final form, *supra*, p. 43 and note 45, it was given somewhat broader scope but it would seem that it remained inapplicable to cases in which no hearing (with or without a record) was required by statute.

A. The Commission's Findings of Fact Have the Requisite Evidentiary Support.

1. *The appellants' general criticisms of the Commission's findings of fact are baseless.*—Appellants are mistaken in their contention (Br., pp. 57, 73, 81) that the findings adverse to the RCA system were based on evidence taken in earlier portions of the hearing and had been superseded by later developments. The Commission plainly not only had the right to make, but the duty of making, its determination on the whole record, and of deciding which evidence adduced in the early stages remained applicable at the close of the hearings.[49] The Commission's findings show on their face that in fact it took into account, and dealt with, claimed improvements and developments in the RCA system made in the course of the hearing (e.g., findings relating to receiver equipment and the development of the tri-color tube (R. 127); findings relating to claimed correction of misregistration (R. 139); findings relating to color fidelity (R. 141); findings relating to claims of eliminating dot structure (R. 144); findings relating to network transmissions[50] (R. 154). Further, the findings in respect of many

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[49] It is to be noted that appellants' claim that RCA's system was so enormously improved that any early evidence concerning it was superseded is squarely at odds with its own claims at the beginning of the hearings. Prior to any demonstration by RCA, its chief engineering witness, after describing the system, testified that "... we expect to stand on the performances we give you [at the first RCA demonstration] ... We will have done all the things we want to do" (Engstrom, Tr. 2768). Similarly, at the very outset of the hearings, RCA had stated that "high standards of performance ... *have been* successfully achieved" (Tr. 2557, Engstrom) [italics supplied]. Appellants' present repudiation of the significance of the early demonstrations is hardly consistent with Dr. Engstrom's explicit testimony.

[50] Appellants (Br., pp. 81-82) particularly criticize, on the ground of supersedure, the Commission's findings and conclusions concerning the RCA system's ability to network its color (*supra*, pp. 13-14, 15-16). Appellants' contention, however, turns on an incomplete paraphrase of the Commission's findings. The relevant findings (First Report, Pars. 119 and 137, R. 154, 161) explicitly deal

of the defects in the RCA system show on their face that they were based on the Commission's own observation at *all* the demonstrations, including the 1950 demonstrations (e.g., small area flicker (R. 134); insufficiency of brightness (R. 137); misregistration (R. 139, 152); color fidelity (R. 141); picture texture (R. 144); impracticability of receivers R. 152)).

And in any event, there is, in addition to the Commission's own viewing of *all* these demonstrations, ample evidence in the record, adduced *after* the date of the claimed improvements, to warrant the Commission's findings. Thus, appellants, in the Jurisdictional Statement (p. 15), contended that the significant testimony was that adduced in 1950. Yet even if only the 1950 testimony—which begins at Transcript 5998—were considered, it is nevertheless clear that the Commission's findings are supported by the evidence. For, as appears from the transcript references in the Statement (*supra*, pp. 8-14), and as will be shown in more detail below, pp. 53-71), the findings concerning the RCA system are supported by testimony adduced in 1950.

Appellants also contend (Br., p. 56) that in its First Report, the Commission "expressly recognized in connection with the CBS system that further information was required with respect to each of * * * seven performance characteristics"; that in its Second Report, the Commission adopted the CBS system "without taking any further evidence"; and that the findings relating to CBS cannot therefore be said to be supported by substantial evidence. Appellants also advance the related contention that certain

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with the April 6, 1950, development by RCA in respect of network transmissions. They show on their face that the Commission made its findings on the basis of the latest developments demonstrated by RCA and not on earlier evidence which had been superseded. See also the discussion below (pp. 67-68) dealing with the substantiality of the evidence supporting the findings concerning RCA network transmission.

of the Commission's findings were based on "speculation and hope" (Br., pp. 55-56, 60, 61).

These contentions, however, involve a mistaken reading of the Commission's findings. While in respect of a number of possible future developments which might be embodied in the CBS system or in apparatus associated therewith, the Commission did note the desirability of additional testing and information concerning their effect upon CBS performance (e.g., horizontal interlace; the utilization of long persistence phosphors; the tri-color tube (*supra*, pp. 23-24)), the Commission explicitly found and concluded that in each instance the CBS system was satisfactory for adoption even without such improvements and developcents (R. 166); see also, e. g. (R. 136) (brightness); R. 144) (sharpness of picture); (R. 163) (flicker); (R. 163-4) (geometric resolution). The desirability of additional information concerning the possibility of future improvements in matters already found to be satisfactory, therefore, obviously does not rob the findings concerning *present* performance of their validity. Thus, appellants' contention that the Commission's determination was in the face of a recognition of the necessity for further evidence or was based on "speculation and hope" is squarely refuted by the Commission's Reports.

Had the Commission adopted the CBS system on the finding that its present characteristics were not satisfactory, but that later developments would lead ultimately to a satisfactory system, the Commission would, indeed, have pitched its determination on "speculation and hope." But the Commission clearly did not do so. On the contrary, in its Second Report, the Commission explicitly stated that its decision rested on its conclusion that CBS "meets all of the criteria for a color system" (R. 415). Hence, it is clear that the Commission's findings and conclusions were not based on speculation and hope, but on concrete evidence concerning the satisfactory nature of what was then in existence.

Appellants have also contended (Br., pp. 14, 19-22) that the Commission's findings and conclusions are invalid since the Commission rejected the testimony of "responsible" industry experts and accepted the testimony only of CBS, CTI and FCC witnesses. The contention is mistaken both as a matter of fact and as a matter of law. As readily appears from the Statement, *supra,* and from the discussion below in Point IA2, in almost every significant instance, the findings of the Commission which were adverse to the RCA system as well as those which were favorable to the CBS system find support in the testimony of the witnesses whom appellants, in the court below, identified as "responsible" industry experts.[51] (R. 589).

In any event, even had the Commission accepted the testimony only of witnesses called by CBS, CTI and the Commission itself, no error would have been involved. The selection among conflicting testimony of different witnesses is a task particularly within the province of the administrative agency. It is settled that it is not error even if an agency rejects—as the Commission here did *not* reject[52]—

[51] These asserted experts are identified as DuMont, Fink, DeForest, T. T. Goldsmith, D. B. Smith, Baker, Engstrom and Brown (the latter two being RCA officials). Their names appear frequently in the citations in the Statement, *supra.* Further, it is to be noted that many of the witnesses for CBS were neither officials nor employees of CBS but were independent manufacturers (Mulhern, Cushway, Kohner, Hamilton, Cogan, Easton, Gross, Kay, Schubert, Shapp, Sparklin), Government experts (Judd, Bureau of Standards; Frazer—Navy Department), independent public opinion or research experts (Dunlap, Riley), or officials connected with other companies unrelated to CBS (DuBarry).

[52] It is true that, in general, the witnesses representing manufacturing interests favored a *type* of system like that proposed by RCA, and opposed the CBS system as incompatible. These witnesses did not, however, favor the adoption of RCA standards now (see, *e. g.*, Tr. 7962-3, 8093 (Fink); Tr. 8203, 8245, 8249, 8270 (D. B. Smith); Tr. 9956 (T. T. Goldsmith); Tr. 9687 (Baker); Tr. 9380 (DuMont)). Rather, in testifying to their recommendations and opinions, they expressed greater optimism concerning some of the future developments of the RCA system than the Commission ultimately found was warranted. But their optimism was

all the testimony of one party, and accepts that of the other party. *National Labor Relations Board* v. *Pittsburgh S. S. Co.*, 337 U. S. 656, 659; see also *United States* v. *Yellow Cab Co.*, 338 U. S. 338, 341.

In addition, appellants, throughout their discussion of the issue of the presence of substantial evidence to support the Commission's findings concerning the CBS system, appear to argue that such findings lack substantial evidence because, in 1947, the Commission refused to adopt standards for an earlier and different version of the field sequential system.[53] At the threshold, it would seem clear that the fact that the Commission previously had reached a different conclusion, in different circumstances, on different evidence, and in respect of a different though related color system, does not affect the substantiality of the evidence supporting its findings in the instant case concerning the present field sequential system.

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based on their favoring a compatible system and opposing an incompatible one (*e.g.*, Tr. 8294 (D. B. Smith)). In any event, the Commission was on sound ground in its skepticism concerning evaluations of the RCA potentials by these witnesses. As it stated in its First Report (R. 159):

> The Commission is aware that of necessity it must rely to a great extent upon industry experts for data and expert opinion in arriving at decisions in the field of standards; our own facilities are too limited to gather much of the data. However, the responsibility for decision is that of the Commission and we cannot feel bound to accept recommendations and expert opinions when we find from a study of the record that the record supports different conclusions. *Moreover, the testimony of many of the parties was not based on field testing conducted by them or upon an analysis of field testing made by others but were simply recommendations and expert opinions of a general nature. In weighing these recommendations and expert opinions we cannot overlook the fact that many of these same parties offered recommendations and expert opinions of the same kind as the basis of their advocacy in the 1946-1947 hearing* [the transcript of which was incorporated into the transcript of the instant hearing] *of the* [RCA] *simultaneous system—a system which never survived field testing* [italics supplied].

[53] FCC Report, March 18, 1947, 11 F.C.C. 1523 (R. 458).

But, in any event, analysis of the Commission's 1947 decision readily establishes that the conclusions there reached do not tend to undermine the findings made by the Commission in this case. In summarizing its reasons for rejecting the field sequential system in 1947, the Commission stated at that time (11 F. C. C. at 1525-6; R. 461-2):

> Before approving proposed standards, the Commission must be satisfied not only that the system proposed will work, but also that the system is as good as can be expected within any reasonable time in the foreseeable future. In addition, the system should be capable of permitting incorporation of better performance characteristics without requiring a change in fundamental standards. Otherwise, the danger exists that the standards will be set before fundamental developments have been made, with the result that the public would be saddled with an inferior service, if the new changes were not adopted, or if they were adopted, receivers already in the hands of the public would be rendered useless.
>
> Judged by the foregoing test, the Commission is of the view that the standards for color television proposed by Columbia Broadcasting System should not be adopted. In the Commission's opinion the evidence does not show that they represent the optimum performance which may be expected of a color television system within a reasonable time. The Commission bases this conclusion on two grounds. In the first place, the Commission believes that there has not been adequate field testing of the system for the Commission to be able to proceed with confidence that the system will work adequately in practice. Secondly, the Commission is of the opinion that there may be other systems of transmitting color which offer the possibility of cheaper receivers and narrower band widths that have not yet been fully explored. • • •

In thus discussing the various characteristics of the field sequential system as it was proposed in 1947, the Commission in its 1947 decision adverted to the conflict in the testimony of the witnesses concerning such matters as the

adequacy of picture brightness, the problems of flicker, and color breakup, and the issue of receiver design. In its discussion of each of these issues, the Commission concluded that insufficient tests had been made, reproducing normal conditions, to permit the Commission definitively to decide how serious these problems were.

It is plain that the essence of the decision in 1947 was first, that there should be more time allowed for new systems which would occupy less channel space and would involve less costly receivers and second, that there had been a failure of proof because of inadequate testing and experience. There was no such failure in 1950. Both difficulties were remedied by 1950. The CBS system had been reduced from 16 mc. channel space to 6 mc. channel space—the same as the present black and white system, and the cost of receivers was shown to be reasonable (*supra*, pp. 21, 22). And, too, the failure of proof in 1946-1947, arising out of inadequate testing and experience had also been remedied by 1950. For on each of the issues which troubled the Commission in 1947, it found on the basis of the 1949-1950 hearings that the evidence was entirely adequate to permit it to conclude, as it did, that the CBS system was satisfactory in all respects. It also concluded that there had been adequate field tests of the field sequential system to permit it to reach these decisions. And finally, by 1950, the Commission had sufficient experience and sufficient evidence before it to put at rest the doubts which it had in 1947 as to whether the field sequential system was "as good as can be expected within any reasonable time in the foreseeable future." For by 1950, as has been seen, the Commission was able to determine, as it did, that no other system performed satisfactorily and none had assured promise for the future.

Clearly, in these circumstances, the existence of Commission doubts in 1947 leave unaffected its explicitly supported resolution of doubts in 1950.

Appellants' broad attacks concerning the substantiality of the evidence supporting the Commission's findings are, accordingly, clearly wide of the mark.

2. *The appellants' specific criticisms of the Commission's findings of fact are baseless.*—Those who, like appellants, undertake to attack administrative findings for which, as appears from the Statement above, there is such clearly supporting evidence, must assume the burden of establishing that such evidence lacks substantiality. See *e.g., North Whittier Heights C. Ass'n* v. *National Labor Relations Board*, 109 F. 2d 76, 83 (C. A. 9), certiorari denied, 310 U. S. 632. This they can successfully do only if they establish either that the evidence cited in support of the findings does not in fact support them or that the evidence cited in support of the findings is so weakened and sapped of its force by qualifying, impeaching or contradictory evidence elsewhere in the record, which must be accepted, that the evidence cited in support is robbed of its substantiality. Where, as here, it so abundantly appears that each finding is squarely bottomed on precise and explicit evidence—usually of a number of witnesses wholly independent of each other—it is not enough to assert merely that there is other evidence elsewhere which, if accepted, might have justified different findings.

Particularly in the light of the teaching of the *Universal Camera* case, *supra*, it is imperative as a matter of appropriate judicial administration that, before reviewing courts are subjected to the burden of analyzing all the evidence in the record to determine substantiality, at least a *prima facie* showing be first made by those who attack the findings. And such a *prima facie* showing can be made in a case such as this, where there is such explicit evidence to support the findings, only by pointing to contrary evidence which must be accepted and which raises doubts concerning the evidence which would otherwise furnish the necessary substantial foundation for the findings. This appel-

lants have not done; indeed, they have not even referred to the supporting evidence at all, and hence they must fail at the threshold. But in any event, as will be shown, the supporting evidence is explicit, and its strength is unaffected by the fragmentary citations upon which appellants depend.

(a) Findings Concerning RCA

RCA color fidelity.[54] Appellants contend (Br., pp. 69-74, 107-108) that there is insufficient support for the Commission's findings (First Report, Par. 87, R. 141) that (1) at all of its demonstrations on the record, RCA had difficulty producing a picture with adequate color fidelity; and (2) the difficulty arose from factors which are a part of the system, such as registration (see *supra*, pp. 9-10), the critical nature of the color control and the utilization of mixed highs and cross-talk (see *infra*, p. 56, note 61). These findings, however, are overwhelmingly supported by the evidence in the record[55] including the Commission's viewing of the demonstrations.

In respect of RCA color fidelity as demonstrated, the record is replete with testimony commenting adversely thereon (Tr. 5664, 5666 (DuMont); Tr. 5219, 5452, 5455, 9926 (T. T. Goldsmith); Tr. 4765 (McIntosh); Tr. 8460, 10640 (Chapin); Tr. 3570-2, 8880-2, 9268, 9285-7, 11205-7, 11242-6 (Goldmark); Tr. 8610 (Stanton); Tr. 3750-1, 3753, 3785, 9313 (Judd); Tr. 3803-4 (DuBarry); Tr. 5943, 5947-8, 5954, 5962, 6254 (Murphy)). These comments establish not only specific aberrations but also seri-

[54] It should be noted at the outset that in their discussion of specific findings, appellants have not set out the findings but, rather, have paraphrased them. These paraphrases often do not accurately reflect the complete findings.

[55] To the extent that appellants' attack on these findings hinges on their contention that the testimony was superseded by later developments or was that only of CBS, CTI and FCC witnesses, the attack, as has been shown above (pp. 48-49), must fail.

ous color contamination and gross color distortion.[56] Typical comments, embodied in testimony adduced in April 1950, and concerning RCA performance *during the later phases of the hearing*, are set out in the margin.[57]

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[56] At several of the official demonstrations, RCA engineers themselves admitted lack of color fidelity in particular pictures (Tr. 3374 (Kell); Tr. 8132 (Engstrom); Tr. 5965-6, 5976 (Brown)). Further, the record reflects comments of several of the Commissioners remarking on lack of color fidelity in the RCA pictures (Tr. 5965, 10733-4, 11192-3).

[57] Typical comments are as follows:

Dr. Goldmark, testifying concerning the performance in late April 1950, of one of a number of RCA receivers placed by RCA in the homes of Commissioners and Commission officials (Tr. 11242-6):

> When the color program came on, it . . . . was a multicolored record and was followed by an announcer whose face appeared vividly green.
>
> The color phasing knob was still in the same position as left by the service people, and since I had doubts this was the natural color of the announcer, I proceeded, with the permission of my host, to readjust the color phasing knob.
>
> I found that when my hand just barely came into contact with the knob rainbow stripes appeared all across the picture, which was evidently the sampling oscillator losing complete synchronism.
>
> After a while, I learned to move the knob ever so gently, by which time the scene changed already and somebody was playing an instrument which I could not yet identify by its color. Someone behind me said, 'Oh, a purple piano'.
>
> I finally managed to stabilize the colors, and the nearest thing to skin tone I could put on the organist's face was purple. Whereupon, the instrument which by its tone identified itself as a Hammond organ, became purplish red.
>
> Each of the organist's hands, because of stationary color fringing at the color [*sic*, camera?], showed more than five fingers all in different colors. . . .
>
> . . . The outline of the organ, on one side, showed very broad, deep purple fringes, again because of camera misregistration.
>
> . . . non-uniform color over the surface was evident.
>
> While the face of the organist was very purplish, the face of the announcer was yellowish, and around his eyes greenish.

Dr. Judd, in charge of reseach in colorimetry, National Bur-

In order to negate this testimony concerning the RCA color fidelity as actually demonstrated, appellants have cited (Br., pp. 70-71, 72) a few isolated comments which are without significance. Four of the citations refer to comments by two of the Commissioners. Two of these Commission comments (Tr. 6139, 8516) refer only generally to the RCA picture, without mention of color; the other two (Tr. 6130, 6900) obviously referred to specific and momentary instances of reasonable color;[58] and in any event both these Commissioners joined in the very findings concerning RCA color fidelity which appellants now attack. Two of the other citations (Stanton, Tr. 8611, Goldmark, Tr. 8882) related only to improvements in RCA color as the hearings progressed: The context of their testimony makes abundantly clear, however, that even with the improvements, the witnesses were of the opinion that the color still fell far short of reasonable quality (Stanton, Tr. 8610-1;[59] Goldmark, Tr. 8880-8882; see also excerpt quoted

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eau of Standards, Department of Commerce, testified late in April 1950:

> The color pictures shown by RCA and the CTI system have been occasionally good and occasionally bad [Tr. 9313].
>
> I think however that the degree of color distortion, which I have seen in the [RCA] demonstrations is so great that many other things have been [sic] done before trying to pick up this last 10% maybe [Tr. 9317].

[58] Neither these comments nor the testimony of Dr. Judd, cited by appellants and discussed below, p. 56, in any event affect the Commission's finding, which was that "color fidelity of a high quality was not *consistently* achieved at any of the demonstrations on the record" (First Report, Par. 87, R. 141) (italics supplied). The Commission also found (First Report, Par. 87, note, R. 141) that sporadically and in particular scenes, RCA had achieved reasonable color fidelity.

[59] It is to be noted that Mr. Stanton explicitly limited his comment to agreeing that "there was a substantial improvement, if you will, *only because the pictures were stable as far as their colors were concerned*" (italics added to indicate portion of quotation omitted by appellants); in the course of the same colloquy, Stanton testified that he did not believe that the pictures had color fidelity (Tr. 8610-1).

in the margin, p. 54, *supra*). Appellants further cite a comment (Br., pp. 70, 108) by Dr. Judd that at a demonstration he had seen at the Bureau of Standards, RCA "was the equal of any of the CBS shows on color fidelity" (Tr. 9314). At the same time, however, he testified (Tr. 9313) that the RCA color pictures were erratic, having been "occasionally good and occasionally bad" (Tr. 9313) and that the degree of RCA color distortion was very great (Tr. 9317). In any event, Dr. Judd's comment cited by appellants refers not to an official demonstration, but a demonstration specially conducted under the supervision of RCA experts, not witnessed by any of the Commissioners, and the conditions or subject matter of which do not appear in the record[60] (Tr. 9314-5).

The foregoing readily establishes that the Commission's findings concerning the quality of RCA's color fidelity as demonstrated are overwhelmingly supported by the evidence in the whole record.

The Commission's findings concerning the difficulties of curing these defects and their inherent nature—findings which, it may be noted, are within their special expert competence—are similarly supported. Thus there was testimony that because of the inherent complexity of the RCA system, and the consequent critical control involving a maximum permissible tolerance of 7 one-billionths of a second in the timing of the RCA color wave which represents the color information, loss of color fidelity, or even inversion or complete loss of color, can readily result (Tr. 4763-5 (McIntosh); CTI Ex. 273, Tr. 4817); that cross-talk[61] in the RCA system causes loss

[60] The only other reference by appellants to RCA color fidelity as demonstrated (rather than to theoretical potentials) is to a comment of the Condon Committee that RCA color was "substantially as faithful" as Kodachrome photographs (Br., pp. 71-72). The Condon Committee Report, of course, was not a part of the record before the Commission (see *infra*, pp. 130-132).

[61] Cross-talk is the intermixture of dots of one color with dots of another color caused by the signals of one color leaking over into the signals of another (Tr. 7638).

of color fidelity[62] and its presence raises grave question whether the colors of objects of a width of three-eighths of an inch or less on a 12 inch screen can be produced faithfully (Tr. 11205-6 (Goldmark)); that the use of "mixed highs" in the RCA system, which results in transmitting the fine detail in shades of gray, rather than in color (RCA Ex. 209, Tr. 2960; see also Tr. 7637-41 (Brown)), may be a source of lack of color fidelity in fine detail (Tr. 11218 (Goldmark)); and that misregistration (the inherent nature of which is discussed below, pp. 60-61) is also a cause of serious color contamination and lack of fidelity[63] (Tr. 2073 (Fink); Tr. 3121 (Goldmark)).[64]

Appellants' citations (Br., pp. 71-72) on the issue of the potentials of RCA color fidelity fail to establish that the Commission's findings were in error. At most, the citations to the testimony of Fink, Lippincott and Goldsmith tend to show only that, as a matter purely of ultimate theoretical considerations, and wholly aside from the problems of apparatus associated with the system (see Tr. 2014, 2018-20), RCA's color fidelity difficulties might be overcome. But there is nothing in the record to show that appropriately correcting apparatus can be produced,[65] and if it can, when it can be produced or at what

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[62] This fact was conceded by Dr. Brown, RCA's own engineer (Tr. 7638, 7709). See also Tr. 7637-41 (Jensen).

[63] For a detailed description of the effects of misregistration in RCA color fidelity, see Tr. 3571-3, 11243-6 (Goldmark); see note 57, *supra*, p. 54.

[64] Other sources of color difficulties in the RCA system include the effect on color saturation of inadequate frequency response in the color receiver (Tr. 3155, Goldmark); and the requirement of matching three tubes at the camera, and maintenance of such matching despite the likelihood of uneven deterioration (Tr. 3155, 3156, 9267, 11206 (Goldmark)).

[65] For example, Goldsmith's testimony concerning the RCA potential assumed the use of "negative lobes" for masking purposes in order to give RCA a high color fidelity potential (see Tr. 9926 (T. T. Goldsmith)). Apart from the fact that it is exceedingly doubtful that such process is usable with the RCA system (Tr.

cost. Beyond this, appellants point only to testimony to the effect that the RCA system improved during the course of the hearings (Br., p. 70). There is no controversy about this; the Commission found only that RCA's potential appeared to be limited and that its realization at the close of the hearing was unsatisfactory.[66] In any event, even if the evidence were in conflict on this issue, it is peculiarly one for the expert resolution of the Commission; the Commission's refusal to accept at face value the predictions and theoretical analyses of the witnesses cited by appellants is clearly not error, particularly in the light of the clear and explicit testimony to the contrary.

RCA picture texture. Appellants criticize (Br., pp. 74-75) the Commission's findings (*supra*, p. 11) concerning the "soft" quality of the RCA picture and the presence of dot structure. In respect of the elimination of dot structure without thereby incurring other disadvantages, the Commission expressed doubts. These findings are clearly supported by the requisite evidence.

The testimony in the record establishes the soft quality and lack of contrast in the RCA pictures (Tr. 3166, 3579, 9293, 9279, 9301-2, 11206, 11213 (Goldmark); Tr. 9457-8 (DuMont); Tr. 10640, 10668 (Chapin)). This lack of con-

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11206-7), RCA itself never proposed the process and the record is devoid of any indication that such a device has ever been developed, or is being developed, for use with the system. In the circumstances, the Commission was hardly required to lay great hopes upon such theoretical and non-existent developments.

[66] Appellants' assertion (Br., p. 72) that the Commission's findings concerning the potentials of RCA's color fidelity "reflect testimony by CBS" is misleading. As already noted, the findings also found support in the testimony of non-CBS witnesses as well as in the Commission's own expert analysis. And Goldmark's testimony cited by appellants concerning RCA's possibility of improvement is torn out of context. When considered in context, it raises no question of his credibility or the reliability of his analyses (see Tr. 8878-8884).

trast arises not only from inadequate brightness (*supra*, p. 9), but also from the contrast difficulties stemming from the dot composition of the RCA picture (Tr. 6084; see also Tr. 8107-8).

That dot structure was present in the RCA pictures is also established by the testimony (see transcript citations, *supra*, p. 11); there is no unequivocal contradictory evidence in the record.[67] As Mr. Chapin, an FCC witness testified (Tr. 10656), dot structure "is probably basic in the system so far as equipment that we have positive knowledge of being available." While, in the testimony partially quoted by appellants (Br., p. 75), Chapin did state that it might be possible ultimately to devise apparatus to eliminate such dot structure, in the portion of his testimony omitted by appellants, Chapin testified that such elimination would involve color contamination (Tr. 10656; see also Tr. 9232, 11217). Nor is there substantial contradiction of this testimony supporting the finding that while elimination of dot structure may be possible, its obviation would be at the risk of further loss in color fidelity, resolution or contrast. Indeed, in the comments which RCA submitted to the Commission after the issuance of the First Report, RCA in effect conceded this risk, stating that "Visible dot struc-

[67] The only witnesses who even attempted to show that dot structure was not visible were RCA officials and their testimony was not unequivocal. General Sarnoff testified that he had seen no dot structure, but if there were such, the remedy would be for the viewer to "sit a little further" from the receiver (Tr. 10069, 10071). Dr. Brown apparently conceded that at least in pictures involving pure primaries, the dot structure was visible, and that "I don't mean to imply at all that the dots disappear" at a point where the viewer is at a distance from the receiver at which the normal line structure would become invisible (Tr. 7746, 7752-3). Dr. Engstrom testified that the line structure normally seen in any television picture when the viewer is close enough tends to disappear before the dot structure disappears as the viewer draws back "a little bit" (Tr. 6089).

ture can be eliminated without *appreciably* impairing contrast or resolution"[68] (R. 325) [italics supplied.]

In addition, appellants do not even advert to the Commission's findings (First Report, Pars. 83 and 133, R. 139, 159), that a major source of the unsatisfactory nature of RCA's picture texture was misregistration, and that such misregistration is a severe problem and was apparent at all RCA demonstrations in the record. These findings, thus left unquestioned by appellants, are overwhelmingly established by the record (see citations to testimony, *supra*, p. 9).[69]

Not only did the Commission find that misregistration is a problem and that it was apparent throughout, but it concluded (First Report, Par. 133, R. 159) that it "is difficult to see how these defects can be eliminated." There is convincing evidence on which the Commission could properly rely for its conclusion,[70] which, in any event, appellants have not attacked in this Court.

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[68] Similarly, Dr. Brown, RCA's own witness, testified that one possible method of eliminating dot structure had not been demonstrated because of its added complexity (Tr. 10750); he also conceded that the circuit which he had suggested would also eliminate mixed highs in that region and hence cause loss of resolution (Tr. 10753).

[69] A detailed description of the effects of misregistration on the RCA picture appears at Tr. 3571-3, 11243-6 (Goldmark). For a comprehensive analysis of the problem itself, its causes and effects, see Tr. 3121-4 (Goldmark), CBS Ex. 212, Tr. 3460.

[70] See Tr. 3099, 3119-25, 3133-5, 11200-4 (Goldmark); Tr. 9380 (DuMont); Tr. 11478-80 (Lippincott). Lippincott, a witness for CTI, testified that so far as apparatus was concerned, no development had been presented to the Commission, either for RCA or CTI, upon which the Commission could rely with confidence in finding that a practical method of registration had been achieved at the camera (Tr. 11481).

The problem of registration is accentuated for an RCA camera used for outdoor televising—a camera which was never shown by RCA during the hearings (*supra*, p. 13). An outdoor camera is frequently moved and subject to much rougher treatment than a studio camera; hence misregistration is even more likely in such a camera (Tr. 11202, Goldmark; Tr. 11480, Lippincott).

It may also be noted that while RCA claimed that a camera using only a single tube, instead of the present three tubes, would solve

RCA receiving equipment. The Commission's findings concerning the complexity, impracticality and cost of RCA's receiving equipment (*supra*, pp. 12-14) are explicitly and firmly supported by the testimony cited above (*ibid.*). The RCA receivers utilizing dichroic mirrors and three kinescope tubes were dismissed by various witnesses as wholly impractical for ordinary use.[71] Thus Dr. DuMont, one of the witnesses described by appellants as a "responsible" industry expert, testified that "the three tube proposition isn't practical from the standpoint of cost, size, and the small angle of viewing" (Tr. 9377); Col. Lippincott similarly testified (Tr. 11512) that the RCA three kinescope receiver "is too delicate; the field of view is too restricted; it is too expensive . . . I cannot conceive of it being . . . sold" to the public as a "commercial possibility or probability of practical use." The difficulties of successfully operating this type of receiver are described in detail in the record; such receivers required constant adjustment, even during official demonstrations when they were under the control of trained RCA technicians (Tr. 3363, 5943-4, 8459-61, 8487, 9285, 10647, 10868, 11292-3, 11242-3, 11245, 11257, 11512, 11637). Indeed, RCA itself in effect conceded the impracticality of these receivers; its own official testified that the single tri-color tube receiver was

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the registration problem at the transmitting end, RCA admitted it was still "trying to learn" how to devise such a camera (Tr. 7585). And a single tube camera in any event precludes the use of the "mixed highs" which are an integral part of the RCA system (Tr. 9297, 9298-9, 11252-4, Goldmark).

[71] The original version of the RCA three kinescope receiver had "something over a hundred [vacuum] tubes" (Tr. 7805); the "simplified" version shown later had 64 such tubes (Tr. 6065). Later, an RCA witness prophesied that "in not too many weeks" RCA would have a three kinescope receiver with 36 or 39 tubes (Tr. 8543), but no such receiver was ever shown, nor did RCA's witnesses ever testify that this reduction had in fact been accomplished. It may be noted that a normal black and white receiver has about 22 vacuum tubes (Tr. 11230-1).

the "missing link" and the "key" to practical home television[72] (Tr. 7913-4).

Necessarily, therefore, appellants must rely on RCA tri-color tube receivers in order to establish any error in the Commission's findings concerning the defects of RCA's receiver equipment. But each of the findings on this score are firmly supported. There is testimony that the tri-color tube is not free from registration difficulties (Tr. 11203). Indeed, at the single demonstration of the tube by RCA, misregistration was apparent and it could not be established whether the fault lay at the camera or at the receiver, or both (Tr. 11202). Further, the evidence establishes without contradiction the presence of a number of defects in the tube as demonstrated.[73] There is also explicit evidence that even with the tri-color tube, the RCA receivers are, because of the inherent complexity of the RCA system and its requirements for higher tolerances, likely to be more complex and costly than CBS receivers (Tr. 11230-2, 11263-6; see also Tr. 8234, 8237-8, 8262-6, 8280).

Particularly since, as the Commission noted (First Report, Par. 116, R. 152), the tube was a last minute development, had been demonstrated briefly and only once, had not been made available to other parties or the Commission's laboratory for study (Tr. 7917, 7920), and concededly required further development (Tr. 7843, 7848, 7928, 10872; cf. Tr. 11485), the evidence plainly supports the Commission's doubts in respect of whether the RCA tri-

[72] Compare the testimony of the Chairman of RCA's Board of Directors concerning the commercial feasibility of RCA's three-tube receiver: ". . . you can always sell a little of anything . . ." (Tr. 10066).

[73] The defects noted in the testimony were lack of brightness (Tr. 9279-80, 11228, 11257-8); insufficient resolution (Tr. 7843, 7927); and presence of a moire pattern (Tr. 8138, 8162, 9379, 9931, 11216-7).

color tube is an "assured fact"[74] (Tr. 9280, 9922, 9924, 11334-5, 11273-4). Indeed, Dr. DuMont testified in response to the question whether the Commission could "rely with confidence" on the tube's ultimate development as usable in a commercial receiver (Tr. 9376), ". . . the proof of the pudding is the final result, and I would not necessarily say that you could rely upon it at this stage of the art". And the Chairman of the Board of Directors of RCA himself testified that if some other organization had developed the tube, he would require much more demonstration before he would be ultimately satisfied than if his own company developed it (Tr. 10077).

In the light of the foregoing evidence, the Commission's findings and conclusions on these issues are plainly supported by substantial evidence. It is true, as appellants emphasize so heavily, that some witnesses were more optimistic about the potential future performance and availability of the tube, and some believed that an RCA receiver using such a tube would be simple and of the same relative cost as a CBS receiver.[75] But citation to such testimony

[74] Particularly because RCA would not disclose how a tri-color tube could be manufactured (Tr. 7917, 7920-1), it was manifestly impossible for the Commission to reach any definitive conclusion either that the tube could be mass-produced (as distinguished from produced by hand) or how much it would cost. In these circumstances, the Commission's expression of doubts were wholly justified, if not in fact compelled.

[75] Appellants' reliance on the Chapin testimony, which they cite (Br., p. 76), is hardly justified. Chapin testified only that "*I am not clear* that there is much significant difference" between RCA and CBS on the issue of receiver complexity (Tr. 10632, italics supplied). The reasons for his lack of clarity are evident: His testimony was in response to a request that he compare the RCA tri-color tube receiver demonstrated on April 6, 1950, with a CBS receiver utilizing horizontal interlace, demonstrated on April 26, 1950 (Tr. 10631-2). The RCA tri-color tube had been demonstrated only once and, as the Commission noted (First Report, Par. 116, R. 152), had not been made available to the Commission's laboratory for study. Similarly, the CBS horizontal interlace receiver had been demonstrated only once and was, in any event, a

merely establishes the existence of a conflict. Particularly in an area involving actual observation as well as judgments *in futuro* based on technical analysis, these findings, explicitly supported as they have been shown to be, are decisive.

It should be further noted in this connection that while RCA's witness conceded that the tri-color tube was the "missing link" in its system (*supra*, pp. 61-62), the ultimate development of a tube which is successful and can be mass-produced at a reasonable cost would at most reduce some of the complexity of the RCA receiver and may also reduce the registration problem at the receiver (*supra*, pp. 9, 12, 62). But the tube, if and when developed, leaves unaffected the basic deficiencies which the Commission found to exist in the system—its inherent complexity, its high cost of operation, its lack of color fidelity and poor picture texture, and its susceptibility to oscillator radiation interference (*supra*, pp. 14-15). Thus it is obvious that the successful development of the tube still would not qualify the RCA system under the Commission's criteria.[76]

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laboratory model (Tr. 9575, 9591). The Commission's findings concerning CBS receivers, of course, related only to disc receivers without horizontal interlace, since those with horizontal interlace had not been proposed by CBS (see *supra*, note 21, p. 17).

In these circumstances, it was obviously impossible for Chapin to make a meaningful comparison between two such recent types of receivers.

[76] This, of course, is the fundamental difference between the effect of the successful development of the tube on RCA, on the one hand, and on CBS, on the other. The CBS system was found to meet the Commission's criteria *without the tube*. The successful development of the tube would provide a means to free CBS of the present direct-view picture size limitation (*supra*, pp. 20-21, 22-23) and permit the use of a so-called "all-electronic" receiver instead of a disc receiver. Thus appellants cannot at the same time contend that the Commission was wrong in finding that the tube is not an "assured fact" and also contend (see *infra*, pp. 74, 87) that, nevertheless, the CBS system is bound by "mechanical" disc receivers and limited direct-view picture sizes.

RCA transmitting equipment. The camera used by RCA uses three image orthicon tubes and a system of dichroic mirrors; it is in effect three cameras in one housing (Tr. 2812-4; Ex. 209, pp. 1-2, Fig. 1, Tr. 2960). It was characterized by Donald Fink (identified by appellants as a "responsible" and "independent" expert (R. 589) as "complex" (Tr. 7970), while D. B. Smith, another "responsible" expert, expressed doubts that such a camera could ever be sold commercially (Tr. 8244). Each of the three tubes in the camera must, in order to produce proper color fidelity, perform identically at all times in image size, image shape, gamma characteristics, contrast range and shading; such a requirement is "a tremendous burden" (Tr. 9296). The evidence establishes that because of the complexity of the camera and its need for three perfectly matched pick-up tubes, and because of the difficulties of maintaining registration and color fidelity, the tube costs alone of maintaining only four cameras by a station would exceed tube costs for black and white operations by $120,000 a year; additional costs are inevitable because of the need for added personnel and extra maintenance to operate the studio equipment (Tr. 3214-5, 11232-3). Further, the testimony shows that because of the inherent complexity of the RCA system, and the need for precise accuracy, proper performance "can be maintained under ideal conditions" but "it is very difficult to maintain them under normal operating conditions . . . the difficulty of maintaining the necessary adjustments with the exactitude with which they must be maintained in order for the RCA system to work has led me to believe that as an engineering problem it was one that was likely to be met with failure to maintain the exactitude, at least as often as it was with success, and particularly in marginal areas and under the day-to-day operating conditions it has always struck me as being substantially an impossibility"[77] (Lippincott, Tr. 11470-1).

[77] The exacting requirements of the RCA system were described by an independent consulting engineer, testifying for CTI, as in-

The camera problems would be aggravated in respect of field or remote pick-up cameras—which are used not in the studio under constant supervision but outdoors and other places away from the studio to televise sports and public events. Field cameras require added compactness and ruggedness (Tr. 11202, 11480). Yet RCA never demonstrated such a camera; nor were any remote pickups demonstrated by it in the course of the hearings[78] (Tr. 9352), and, in their brief, appellants do not contend otherwise.

While an RCA witness testified that a single tube camera could be developed, he admitted that "for the time being", RCA contemplated continuing to use the three-tube camera (Tr. 6180). In any event, he testified (Tr. 7585) that the single-tube camera was still in the "research stage", which he defined as the stage at which they "are trying to do it in the first place"; they had not yet reached the development stage in which "you are trying to make it work."

But the evidence also establishes grave doubts whether such a single-tube camera can be successfully built for the

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volving a maximum permissible tolerance in timing of seven one-billionths of a second—tantamount to hitting a 400 foot target on the sun 93,000,000 miles away (McIntosh, Tr. 4767).

As a result, according to Mr. McIntosh, the normal station transmitter is not adequate for broadcasting under the RCA system; he testified (Tr. 4765-6):

> In this connection, it seems highly significant that Dr. Brown [an RCA engineer] testified that the output circuit of station WNBW had had to be retuned in order to transmit color under the RCA system. That station is owned by the National Broadcasting Company, the technical standards of which are as high as those of any company in the industry, but in spite of this fact the WNBW transmitter was apparently not in sufficiently good adjustment to meet the requirements of the proposed RCA color television system.

[78] An RCA witness testified at the opening of the hearings in the Fall of 1949 that RCA has begun development of a remote camera which would be ready the following Spring (Tr. 2718, 2818). The camera was never reported as having been completed, and it was never shown.

RCA system. The problem was described as "fantastically difficult" (Tr. 11253) and even if it could be successfully built it is doubtful that it could transmit mixed highs, which are an essential of the RCA system. (Tr. 9296; see also Tr. 9298-9, 11252-4.)

Appellants, in their brief (pp. 79-80), seek to undermine the Commission's findings on this score only by reference to statements by RCA's own witnesses that no difficulties had been encountered by RCA in operating its station equipment, to an isolated statement by another witness that RCA had ". . . done a wonderful job . . . with their color cameras", and to an argument that station costs are not important in any event.

It is too plain for discussion that the evidence described above amply supports the Commission's findings and conclusions concerning RCA station equipment, and that the contrary evidence cited by appellants is wholly insufficient to establish the invalidity of the Commission's findings and conclusions.

RCA network transmission. Appellants' also attack (Br., pp. 81-83) the Commission's finding (First Report, Par. 119, R. 154) that "Further testing" is necessary "before a final judgment can be made" in respect of the RCA system's ability to transmit color over 2.7 megacycle cable for networking purposes (see *supra*, p. 13), as well as the Commission's conclusion (First Report, Par. 137, R. 161) that "there is not adequate assurance on this record that color pictures can be transmitted over the 2.7 megacycle coaxial cable facilities." These findings and conclusions, peculiarly within the competence of the Commission to make since they involve a judgment as to the quantum of actual performance which is necessary to provide assurance of an accomplished fact, are plainly justified by the record.

The record shows that throughout the initial phases of the proceedings, RCA was unable to transmit color over

2.7 megacycle cable; the color was lost in the process and was received as black and white (Tr. 2718, 5964). Toward the close of the hearing, RCA claimed to have developed a method of obviating this difficulty, and on April 6, 1950, it conducted a single brief demonstration (Tr. 8140-4). The demonstration did not, however, actually utilize the cable, but merely "simulated" its use (Tr. 8141-2). RCA's witness testified that it had actually used the cable only twice (Tr. 8142); he also testified that RCA had made no color measurements on the effect of the intensities of the cable since the method of thus transmitting RCA color over the 2.7 megacycle cable "is too new" (Tr. 8152). He also stated that further field test of the operation was planned (Tr. 8144).

The Commission was plainly justified on the basis of the foregoing evidence in finding that the ability to network RCA color over 2.7 megacycle cable had not yet been sufficiently proven. Appellants point to no evidence which weakens the finding; they only assert that they disagree with it and that, on the basis of a selection of some of the evidence just summarized, the Commission should have come to a different conclusion. Obviously this does not establish that the finding is in error.

RCA susceptibility to interference. The Commission found (First Report, Par. 101, R. 145) that the RCA system has greater susceptibility to oscillator radiation than does black and white television or the CBS color system. The testimony establishes this fact[79] without contradiction, and RCA's own witnesses conceded it (Tr. 6073, 7593, 8514, 10685; RCA Ex. 425, Tr. 10761). It also establishes that the RCA system is about twice as susceptible to such interference as is the standard black and white system, and that the effect may be not only to produce an annoying pattern on the picture but to destroy the color altogether (Tr. 8458, 11654-6).

[79] Tr. 8222, 8263 (D. B. Smith); Tr. 8458-9, 8466-8, 11651-6 (Chapin); FCC Ex. 389, Tr. 8491; FCC Ex. 465, Tr. 11653.

Appellants do not, in effect, attack the validity of the Commission's findings on this issue; rather, they seek to minimize the importance of the problem (Br., pp. 80-81; see also p. 103). But the gravity of such susceptibility is, again, a matter peculiarly within the Commission's province. From the language of Section 301 of the Communications Act, particularly Section 301(d), it is clear that the jurisdiction conferred by the Act extends beyond concern with "interference by broadcasters with each other." Appellants' suggestion that this was the problem with which the Commission is here concerned (Br., p. 80; see also p. 103) is entirely unwarranted. The Commission was here concerned not with the cause of interference but with RCA's greater susceptibility to such interference caused by other television receivers (including, of course, ordinary black and white receivers). The Commission's conclusion that the interference susceptibility is not lightly to be dismissed is firmly based on the testimony in the record of the Commission's own engineer, who had conducted laboratory tests, and who testified to its significance and the likelihood of its accentuation in the future (Tr. 8458-9, 10661; see also *infra*, pp. 106-107).

In the circumstances, appellants raise no issue of the substantial support for this finding or of the reasonableness of the Commission's conclusion that this was a deficiency in the RCA system (Second Report, Par. 3, R. 414).

Field testing of the RCA system. Appellants attack (Br., p. 83) the Commission's conclusion (First Report, Par. 138, R. 161) that "the RCA system has not met the requirements of successful field testing." The Commission emphasized the new techniques employed by the RCA system[80] and the complexity of its equipment; it reaffirmed its earlier statement of policy that (First Report, Par. 138, R. 162):

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[80] RCA's chief witness himself underscored the "new" and "unique" nature of the RCA system (Tr. 2660).

> Before approving a new system of television it is indispensable that there be an adequate program of field testing. Receivers and transmitters must be subject to numerous tests over a long period of time and at a diversified set of locations and operating conditions so that operation under average home conditions is closely approximated. Without such field testing, there is no assurance that all fundamental defects have been eliminated. There is a great difference between the performance of a system in a laboratory with trained personnel and its operation in the home by the average citizen. In the history of electronics there have been developments which looked promising in theory and even in operation in the laboratory but which revealed such fundamental defects when subjected to adequate field testing that they had to be abandoned entirely.

Appellants' attack on the Commission's conclusion that the RCA system has not been sufficiently field tested comprises nothing more than reference to testimony of RCA witnesses and to RCA exhibits in which various activities, often in conclusory terms, are described.[81] Even were this evidence accepted at its face value, the determination whether such activities constitute sufficient field testing is within the special province of the Commission. And in any event, RCA's own evidence, to which it refers, readily establishes how far its "tests" fall short of meeting the elements of field testing, quoted above. There is nothing to establish definitively that average home conditions for color reception were approximated, or that all of RCA's activities were not supervised by its expert engineers, or that a wide variety of transmitter and receiver locations,

[81] Thus, for example, RCA Ex. 377 (Tr. 7829) purports to be a "summary of field test activities", but it is nothing more than a table of contents embodying references to various RCA exhibits and to the testimony of RCA witnesses discussing a number of field test items. But the testimony thus referred to, in turn shows that in many instances no field tests were conducted and the conclusions were reached either on the basis of laboratory analyses by RCA engineers or upon theoretical consideration (Tr. 6037-6124).

operated under normal day-to-day circumstances, were involved. Rather, the indications are quite to the contrary.[82]

Further, it may be noted that if explicit testimonial support be needed for a conclusion of this nature, it is abundantly present in the record. Almost without exception, the witnesses characterized by appellants as "responsible" industry experts testified that the RCA system was not yet ready for standardization and that further tests were necessary (Tr. 7962-3, 8093 (Fink); Tr. 8203, 8245-6, 8249 (D. B. Smith); Tr. 5289 (T. T. Goldsmith); Tr. 9687 (Baker); see also Tr. 7411, 7451 (Jensen); Tr. 11330 (Matthews).

Clearly, appellants' contentions on this score do not, in the light of the foregoing, raise any serious doubts concerning the obvious validity of the Commission's conclusion that the RCA system has not been sufficiently field tested.

(b) *Findings concerning CBS.*

Appellants' attacks on particular findings and conclusions of fact concerning the CBS system have been so argumentatively diffuse that it is exceedingly doubtful whether they involve the question of substantial supporting evidence at all. Nevertheless, we shall examine briefly herein the evidentiary support in the record for the Commission's findings of fact concerning the CBS system.

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[82] So far as the record shows, only one transmitter in one city was used for the "field tests" which in any event, involved home reception of color in black and white rather than home reception of color in color. These are the "tests" to which appellants so expansively refer (Br., p. 83). None of these alleged "thousands of persons" saw RCA *color* pictures and but 50 comments were received concerning the black and white pictures viewed by the public, although the potential audience in the city comprised 100,000 families (Ex. 367, p. 7; Tr. 7496).

Implicit both in RCA's Progress Report of July 31, 1950 (see *infra*, pp. 125-130) on which appellants rely so heavily, and in RCA's petition for delay of October 4, 1950, is the concession by RCA that further field test of many elements of the RCA system is necessary.

CBS picture quality and system equipment. It is abundantly clear that the Commission's findings concerning the satisfactory nature of the CBS color picture and the simplicity of its equipment have the requisite evidentiary support in the record.

Thus, for example, in respect of the quality of the CBS color picture, Dr. Judd, in charge of research in colorimetry at the National Bureau of Standards, Department of Commerce (Tr. 3746), testified that "the color rendition by the CBS system has been uniformly good" (Tr. 9313), that the excellence of the quality "consisted in clear pictures, adequate brightness, and freedom of misregistration" (Tr. 9315), and that "I would like very much to get a set which had color fidelity equal to the CBS system and so far I have not been at all tempted to buy a television receiver" (Tr. 3757-8). George Sleeper, vice-president and chief engineer of CTI (Tr. 4121), the proponent of a rival system which Sleeper had developed, testified that CBS "had a very excellent picture" (Tr. 4420). W. R. G. Baker, a witness for the Radio Manufacturers Association, who opposed the adoption of CBS standards, testified that the CBS picture was "a superb picture" (Tr. 9850). Dr. Charles W. Geer, a professor of physics unconnected with the broadcasting or manufacturing industry, and appearing for himself (Tr. 3831), testified that he was "very well pleased with the demonstration of the CBS system", that he was "pleased enough with the Columbia system right now", and that "we have no right to ask that color television be improved a great deal more than was shown at the Columbia demonstration" (Tr. 3923). And these views were confirmed by thousands of members of the public to whom CBS pictures were demonstrated and whose reactions were recorded and tabulated: they overwhelmingly approved of the over-all quality, as well as the component characteristics, of the CBS picture.[83]

[83] The results of these surveys are embodied in Ex. 332 (Tr. 6393) and Exs. 348 and 349 (Tr. 6741).

The foregoing evidence, deriving from observers who were entirely unconnected with CBS,—as well as other extensive evidence cited above in the Statement[84]—plainly support the Commission's findings and conclusions concerning the satisfactory nature of the CBS picture quality. And, it may further be noted, this was a matter peculiarly determinable as a matter of observation, and was in fact observed by the Commission on the record. Its findings on this score are, hence, especially entitled to weight.

The evidence similarly provides a firm basis for the Commission's findings concerning the simplicity of the CBS equipment. The precise description of the nature and components of both the transmitting and receiving equipment are in the record.[85] There is explicit testimony concerning the simplicity and reliability of the equipment[86] (Tr. 3219-3220, 3488, 3517-8, 3528, 3813, 6561-2, 8460, 9296, 11199, 11230-1, Ex. 319, (Tr. 6261), Ex. 337 (Tr. 6575). The costs, reviewed by the Commission in its findings, are also set out in the record in detail.[87] Further, as it noted

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[84] See findings concerning CBS flicker, *supra*, p. 16, brightness-contrast, *supra*, p. 17, registration, color breakup and fringing, *supra*, pp. 17-18, color fidelity, *supra*, p. 18, and picture texture, *supra*, p. 19.

[85] The transmitting equipment is described at Tr. 3085, 3090, 3094, 6563, and in Ex. 210, Items 12 and 13 (Tr. 3460), Ex. 339 (Tr. 6575), Ex. 340 (Tr. 6575), Ex. 407 (Tr. 10813). The receiving equipment is described most fully in a set of 46 mechanical drawings, Ex. 269 (Tr. 4719); see also Tr. 3217-9, Ex. 210, Items 10 and 14 (Tr. 3460).

[86] Thus the evidence shows that the CBS receiver requires a total of only three more vacuum tubes than a standard black and white receiver (Tr. 11230-1); it also shows that no controls for the color receiver in addition to those for a black and white receiver are needed (Tr. 3219-3220); and the additional all-electronic circuits required for the color components of a set require only two tubes, using a current drain of only 8/1000ths of an ampere (Tr. 3220).

[87] For evidence concerning the costs of transmitting equipment, see Ex. 210, Item 7 (Tr. 3460), Ex. 396 (Tr. 8875), Tr. 3212-3, 10822-3. For evidence concerning the costs of color receivers, see Tr. 3243, 3513, 3517, 3521, 3527-8, 3592, 3594, 3666-7, 3689, 4975-6, 9000, 9089, 9099, 9136, 9137, 10048-9, 10091, 11230-2.

in its First Report (Pars. 54, 113, 140, R. 128, 152, 163), the Commission had an opportunity to observe the equipment, and its performance, in a number of demonstrations involving a wide variety of subject matter originating both in the studio and out of doors.

The foregoing readily establishes, accordingly, that the Commission's findings of fact concerning the satisfactory nature of the CBS picture quality and the simplicity of the CBS equipment are more than adequately supported by the evidence in the record.

Indeed, appellants do not really quarrel with these findings. They insist only that "mechanical disc" receiving equipment is unsatisfactory in this "atomic age" (Br., p. 65). That contention hardly constitutes an attack on the sufficiency of the Commission's detailed findings that the quality of the CBS picture is satisfactory and the CBS equipment is simple. Rather, appellants' argument at most raises the issue of whether the Commission was reasonable in approving a system which currently uses disc-type receivers but which can, as the Commission found (First Report, Par. 144, R. 164), dispense with the disc and use a tr color tube of the type demonstrated by RCA—if such a tube should be successfully developed (see *supra*, note 76, p. 64). Clearly, the action of the Commission in not ruling out the CBS system on the ground that at the present time it uses a disc in its receivers (as well as projection receivers without a disc) is not unreasonable.

CBS "susceptibility to flicker." There is ample support for the Commission's findings that the brightnesses achieved by the CBS disc receivers are adequate for normal home viewing and that at these brightnesses, flicker is not objectionable (*supra*, p. 16). The evidence shows without dispute that the CBS disc receiver achieved a brightness of between 20 to 30 foot lamberts (Tr. 3319, Ex. 276, Item D2, pp. 11 and 29 (Tr. 5737)). Further, the evidence establishes that at the minimum desirable view-

ing distance,[88] no flicker at all is apparent at 18½ foot lamberts brightness, while flicker does not reach the point of being objectionable until a brightness three times as high is reached (52½ foot lamberts) (Tr. 3170-1, 3177-8, 5159, 5282, 5351, 8112, 8957, 8964, 9249). There is also clear and direct evidence that the brightness achieved by CBS disc receivers at which flicker is not apparent is wholly satisfactory. An exhibit prepared by the Research Division of the Allen B. DuMont Laboratories, Inc., and submitted in evidence by that company, concluded that "Direct-view color receivers of the mechanical type have acceptable brightness . . ." (Ex. 276, Item D2, Conclusion No. 3 (Tr. 5737)). Dr. Judd attributed the uniform quality of CBS pictures to "adequate brightness" among other factors[89] (Tr. 9315). The public reaction surveys submitted by CBS also showed a virtual unanimity among the thousands of

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[88] Appellants are mistaken in stating (Br., p. 61) that the maximum brightness that can be enjoyed at "the most favorable" viewing distance is 18½ foot lamberts. Rather, as stated in the text, the distance at which flicker first becomes just perceptible in a picture of the brightness of 18½ foot lamberts is the *minimum* viewing distance—i.e., the minimum distance at which the lines in a television picture are no longer visible. For CBS pictures, that minimum distance is established to be a little more than five times the picture height (Ex. 344, pp. 2-3, Fig. 2; Tr. 3584-5, 3986-7, 6591-2). RCA's own witness, however, testified that the *minimum* viewing distance is seven or eight times the picture height (Tr. 7752). Since flicker becomes less apparent the further the distance between the television receiver and the viewer, flicker in the CBS picture would not even be apparent at the minimum viewing distance thus specified by RCA until the brightness reached 24 foot lamberts and would not be objectionable until a brightness of 72 foot lamberts was reached (Tr. 3170-1, 3177, 8956-7, 8962-4, 9250). And the evidence establishes further that the *normal* viewing distance—that is, the distance from the receiver at which viewers actually sit—is between 12 and 15 times the picture height (Ex. 346; Tr. 6675-8). Thus at normal distances, the brightness of the CBS picture can be considerably higher than 24 foot lamberts before flicker becomes apparent.

[89] A survey conducted by an independent consulting engineer (Tr. 8090, 9915-6) showed that the brightness of new standard black and white receivers on the market averaged only 17 foot lamberts (Ex. 397 (Tr. 8877); see also Tr. 8874-6).

observers surveyed that the CBS receivers were adequately bright, or, indeed, a little too bright, while virtually none noted any flicker (Ex. 332, pp. 2, 16, Tr. 6393; Ex. 348, p. 11, Tables 3a, 3b and 6c, Tr. 6741; Ex. 349, p. 6, Tables 3 and 6b, Tr. 6741). And Donald Fink testified (Tr. 2167-8) that he had noticed flicker on CBS receivers only when he was next to them, that at normal viewing distances, he saw no flicker, and that the flicker he had seen would not have been noticed by the public.

It is clear, accordingly, that there is ample support for the Commission's findings that at levels of brightness which are wholly satisfactory, there is no objectionable flicker in CBS disc receivers.

Appellants' citations (Br., pp. 61-64) do not undermine the substantiality of this supporting evidence on this issue. At most, the citations establish some conflict in the evidence. But in any event, the evidence cited by appellants, even standing alone, is not persuasive. Thus appellants refer to a statement by Dr. DuMont (Tr. 9499) that " . . . you cannot get a bright enough picture without flicker in the CBS system . . .". As shown above, there not only was ample contrary testimony which the Commission clearly was entitled to accept, but Dr. DuMont's conclusion is squarely at odds with the report of his own Research Division (see *supra*, p. 75). The reference by appellants to the comments of Motorola (Br., p. 63) deals only very indirectly and incidentally with flicker; in any event, the reference is to an exhibit (Ex. 384 (Tr. 8464)) submitted by the Radio Manufacturers Association; the statement in the exhibit to which appellants refer is by a manufacturer who was not a party to the hearings, did not appear as a witness, and was not subject to cross-examination. Not only was the statement pure hearsay, but the exhibit was not described, discussed, or vouched for by any witness (Tr. 8464), and was offered and admitted only for an exceedingly limited purpose (Tr. 8463-4). Appellants have now sought to use it for a different purpose. Clearly, 'evi-

dence" of such a nature does not even rise to the status of substantiality, let alone to the dignity of such evidence as would undermine the evidence, cited above, which supports the Commission's findings.

Further, appellants (Br., pp. 63-64) refer to a report submitted in an earlier hearing, the transcript of which was incorporated by reference in the instant hearing, purportedly indicating a maximum brightness "useful" for television of 1400 foot lamberts and a minimum brightness of 30 foot lamberts. This report, it may be noted, was never referred to or discussed in the course of the instant hearings before the Commission. It is, in addition, irrelevant to the question of the adequacy of brightness of CBS disc receivers since, as the Commission found, a major purpose of brightness is to permit maintenance of proper contrast in the picture. Because the disc serves to filter out light, a proper contrast can be maintained in disc type receivers at far lower levels of brightness than in ordinary black and white receivers (First Report, Par. 74, R. 136)—with which the report cited by appellants was concerned. Moreover, the report is on its face so highly conditional and qualified[90] that it clearly does not constitute evidence tending to destroy the explicit evidence cited above to support the Commission's findings, which establishes both that the brightness even of black and white receivers is far lower even than the minimum indicated by the report (*supra*, note 89, p. 75) and that the brightness of CBS pictures is in any event wholly satisfactory.

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[90] Thus, for example, the report states that its conclusions are "tentative" (p. 127); that "full knowledge in this field requires a program of work far beyond the [committee's] capacity" (p. 127); that "the validity of these results, for television pictures, should be regarded as not fully established" (p. 129); that "the trends may be indicated by these tests, though there is insufficient data to draw firm conclusions" (p. 140); and that "it is to be understood that these findings cannot pretend to be a scientific consideration of the subject, but merely the record of a very small number of tests witnessed by the [committee]" (p. 143).

Further, appellants cite (Br., p. 62) a statement by Dr. DeForest that the CBS system a "color subtractive" system and hence there is "an enormous loss of light." Dr. DeForest's statement, however, is robbed of its significance not only because of his obviously incorrect characterization of the CBS system as "color subtractive". (Tr. 5988-9, 5906-7) but because in fact he had never witnessed a demonstration of the CBS system (Tr. 5899-5901).

Appellants' only other reference (Br., p. 62) to testimony (other than that which merely relates to the general policy consideration of whether the Commission should have insisted on higher brightness)[91] concerning brightness is to a statement by T. T. Goldsmith of DuMont that at a distance of 15 feet "there is very perceptible flicker" on a CBS receiver the brightness of which was 18 foot lamberts and to a statement, in response, by Murphy of CBS that "Well, there should be" (Tr. 3327). But the record establishes that the flicker referred to in this colloquy did not involve the system flicker which results from brightness. That, in fact, the "flicker" referred to by Goldsmith could not have been that type of flicker, but rather must have been a wholly extraneous phenomenon resulting from a temporary defect in equipment unrelated to the system (cf. Tr. 3282-5), is in any event apparent from the fact that, as the record establishes without contradiction (Tr. 3177-9, 8956, 8962-4, 9250, 11226), system flicker on CBS disc receivers is not even perceptible at a brightness of less than 24 footlamberts for a viewing distance of seven times the picture height. Hence since, as appellants note, Goldsmith was sitting at a distance of 15 feet (far greater than seven times the picture height) and the receiver brightness was 18 foot lamberts, the "flicker" which Goldsmith claimed to have observed, and which many others present did not observe (Tr. 3328), could not have been the type of flicker here in issue.

Appellants' citations thus supply little comfort to their contention. Plainly, the evidence which in fact supports

[91] This policy issue is discussed below at p. 88.

the Commission's findings, discussed above (pp. 74-76) is not affected, let alone destroyed, by the evidence advanced by appellants.

CBS geometric resolution. Concerning the Commission's findings and conclusions relating to CBS "geometric resolution" (First Report, Pars. 90, 143, R. 142, 163), appellants argue (Br., pp. 67-69) that the reduction in such resolution which the Commission in fact did find to exist is a defect to which the Commission should have given greater emphasis. This contention, of course, raises no issue of substantial evidence whatever.[92] Indeed, the primary facts found by the Commission concerning the precise resolution of the CBS system (R. 142) are undisputed in the record (5719; Ex. 204, Table 1 (Tr. 2589), Ex. 302 (Tr. 6183)). The *results* of the reduction in resolution in its effects on the CBS picture, and the importance to be attached to the reduction, are matters within the particular province of the Commission.

But if supporting evidence be needed, it is clear that there is such evidence for the Commission's conclusion that in the CBS pictures the addition of color "more than outweighs the loss in geometric resolution so far as apparent definition is concerned" (First Report, Par. 143, R. 163).

Thus, the evidence is clear that, as the Commission found (First Report, Par. 88, R. 142), there are, in addition to resolution, other and important factors such as contrast and sharpness, which enter into the "apparent definition" (i.e., clarity and ability to portray detail) of a picture[93] (Tr.

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[92] To the extent that appellants' contention raises an issue concerning the reasonableness of the Commission's failure to include a requirement of higher resolution as a criterion for adoption of a color system, see *infra*, p. 86.

[93] This is supported by witnesses for CTI, RCA and CBS. George Sleeper of CTI testified (Tr. 4285) that "four factors are involved in the overall definition of a picture: These are: the geometric resolution, the contrast ratio, the rate of change from one contrast level to another, and color." Dr. Engstrom of RCA agreed (Tr. 10908; see also Tr. 10912) that there was a dis-

3184-8, 4011, 6603, 6627, 6636-7, 8893-5; see also Tr. 4285, 10908, 10912). The record also establishes that color adds considerably to apparent definition. Mr. McIntosh, an independent consulting engineer who testified on behalf of CTI and who opposed the adoption of CBS standards on the ground, *inter alia*, of its reduced geometric resolution (Tr. 4743-6), nevertheless stated (Tr. 4743): "It is well known that the addition of color to a picture at least seems to the human eye to increase its effective definition. As a

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tinction between "absolute detail" (geometric resolution) and "other qualities in the picture that go to make up the intelligence that the public can enjoy"; he identified these "other qualities" as "matters of contrast, tone range and other things." Dr. Goldmark of CBS testified (Tr. 4011) that geometric resolution is "one of maybe 20 items which will determine whether that color television picture is adequate or not". In a more detailed analysis, Goldmark testified (Tr. 3184-5):

> The over-all definition of a television picture is an integration of the information conveyed to the eye by the following factors:
>
> The first factor is the number of picture elements within the area of the picture. This I will refer to as 'geometrical resolution,' and it is upon this single factor of definition which the witnesses of the other parties who have testified have focused their criticism.
>
> The second factor of over-all definition is the visual contrast among the various objects in the picture. In black and white pictures this contrast is created by variations in lightness and darkness over the picture area. This I will refer to as plain 'contrast.'
>
> In color pictures this contrast is created by the same variation in lightness and darkness, and in addition by a third factor—variation in color hue and saturation of the objects viewed. This I will refer to as 'color contrast.'
>
> The fourth factor of over-all definition is the rate of transition from one contrast level to another, or from one color hue or saturation to another. This I will refer to as 'crispness.'"
>
> * * * * *
>
> The effect of the combination of geometrical resolution, contrast, color contrast, and crispness in producing over-all definition cannot be measured on paper with available yardsticks and can only be evaluated by actual viewing of pictures.

result, a colored picture should, in general, have greater apparent definition than a black and white picture containing the same number of picture elements." [94]

Such testimony, particularly when supplemented by the Commission's first hand observation of the pictures at on-the-record demonstrations,[95] obviously provides a firm foundation for its conclusion that in the CBS pictures, the reduction of geometric resolution is not significant in the overall quality of the pictures and that the presence of color "more than outweighs" the reduction by providing added apparent definition. But further, there is explicit support in the record for the conclusion itself, the pub-

[94] A simple explanation of the significance of "apparent" definition appears in the testimony of George E. Sleeper, Jr., a CTI witness (Tr. 4287):

> Q. Does the presence of color in a picture increase its definition?
>
> A. Yes. The exact amount of increase depends upon the color contrast in the picture, but for all ordinary subject matter color will considerably increase the definition.
>
> *The Chairman:* What do you mean by definition? The number of lines? or does it appear to increase the definition? Which do you mean?
>
> *Witness:* It appears to increase the definition because there is more color information in a color picture, there is more information transmitted from the camera to the receiver than there is in a black and white picture.
>
> *The Chairman:* Is there actually greater definition in a color picture than in black and white?
>
> *Witness:* Not in the terms of elemental detail theoretically. Actually, there is.
>
> *The Chairman:* As a matter of fact, is there not less definition in a color picture than in black and white?
>
> *Witness:* No, that is not true. [Tr. 4287]

[95] It is significant that despite the fact that measurements at the demonstrations showed somewhat higher geometric resolution in RCA pictures than in CBS pictures (Ex. 302, Tr. 6183), Dr. Goldmark of CBS (Tr. 6605, 6610), Mr. Chapin of the FCC (Tr. 10640, Ex. 388, p. 4, Tr. 8491) and Dr. DuMont (Tr. 9386, 9458), one of the witnesses identified by appellants as a responsible industry expert, each testified that the overall *appearance* of clarity and definition in CBS pictures was superior to that of the RCA pictures.

lic reaction surveys in evidence show that an overwhelming majority of those who had witnessed demonstrations of the CBS color pictures were of the opinion that their "clearness of detail" was either "excellent" or "very good"[96] (Ex. 348, p. 3, Tables 4a and 4b, Tr. 6741; Ex. 349, Table 4, Tr. 6741; see also Ex. 332, p. 22, Tr. 6393).

In the light of the foregoing it is plain that if appellants do in fact contend that the Commission's findings concerning CBS geometric resolution and overall definition are unsupported by substantial evidence, the contention is wholly mistaken.

CBS picture-size limitation. Appellants attack the Commission's findings and conclusions (*supra*, pp. 20, 22-23, 29) concerning CBS picture-size limitations (Br., pp. 58-60). The attack, however, centers on the argument that the findings were based on "speculation and hope", the error of which has already been established (*supra*, pp. 46-47). The only findings or conclusions, insofar as here relevant, on the issue of picture-size limitations, were that (1) the present CBS direct-view receiving apparatus *was* limited to 12½ inches—a finding which appellants obviously do not dispute, but embrace (First Report, Par. 111, R. 150); and (2) the limitation was not fatal since the CBS color pic-

[96] There is similarly firm support in the record for the Commission's conclusion (First Report, Par. 143, R. 164) that, despite the reduction in geometric resolution, the black and white picture received from CBS color transmissions "is still an acceptable picture." The same public reaction surveys show that of the persons viewing the demonstration of black and white from CBS color transmissions. 21.8 per cent rated the overall quality of such pictures "much better" than standard black and white pictures; 31.2 per cent rated it "somewhat better"; 40 per cent rated the quality about the same; and only 3.7 per cent felt the quality was poorer than that of standard black and white pictures (Ex. 348, p. 3, Table 11, Tr. 6741). Further, over 80 per cent rated the "clearness of detail" of the black and white pictures from CBS color transmissions as "excellent" (34.1 per cent) or "very good" (46.3 per cent); 15.7 per cent rated it "good"; 2.5 per cent rated it "fair"; and only 0.2 per cent rated it "poor" (Ex. 348, pp. 5 and 7, Table 10, Tr. 6741).

tures on a 12½ inch direct view receiver and on an unlimited size projection size receiver are satisfactory and "the attractiveness of color pictures may be sufficiently great to cause people to prefer a direct view receiver with a 12½ inch tube or a large size projection receiver if they can get color as against a 16 inch, 19 inch or larger direct-view receiver that is limited to black and white pictures" (Second Report, Par. 12, R. 418). This latter conclusion is obviously one involving the judgment of the Commission within its special province, and can hardly be shown to be unreasonable (see *infra*, pp. 87-88). In any event, there is explicit evidence in the record (*supra*, note 37, p. 29) that the public may well prefer 12½ inch color pictures to larger size black and white pictures. The findings and conclusions on this issue are, accordingly, clearly invulnerable.

3. *Summary and conclusions.*—As has been seen, appellants' attack on particular findings shows that in considerable part they turn on the contention, already shown to be mistaken (*supra*, pp. 45-46, 48-49), that those findings are not properly supported because they were based on early testimony which had been superseded by later developments or on testimony of FCC, CBS and CTI witnesses.[97] In part, appellants' attack on particular findings and conclusions, especially those relating to the CBS system, is not actually directed at the question of supporting evidence but embodies a miscellany of argumentative material[98] which, if sound, might tend to show that the Commission's ultimate judgments were wrong, but do not in any way raise a question concerning the presence of evidence to support the findings.[99] At most, appellants show only that the record

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[97] E.g., appellants' contentions relating to the Commission's findings concerning RCA color fidelity and picture texture (Br., pp. 69-75).

[98] E.g., appellants' contentions relating to the Commission's findings concerning CBS picture size limitations, flicker characteristics and resolution (Br., pp. 58-64, 67-69).

[99] To the extent that these arguments raise questions of the reasonableness of the Commission's action, see *infra*, pp. 85-96.

included some fragments of testimony which, had the Commission also rejected other testimony which in fact supported its findings, would have permitted findings by the Commission different from those which it actually made.[100]

In respect of none of the particular findings and conclusions do appellants even attempt an analysis of the overwhelming supporting evidence which has been cited herein. Appellants do not establish, and indeed, do not even seek to establish, that the sparse and unpersuasive evidence they cite so destroys the evidence cited herein that the latter is drained of its otherwise clear substantiality.

It is submitted that in these circumstances, and particularly since the Order here involved is a rule-making proceeding,[101] appellants raise no serious question concerning the validity of the Commission's findings of fact. They must do more than show a mere conflict in testimony. They must do more than show that it may have been possible, or even reasonable, for the Commission to have reached different results. Where, as here, there is such an overwhelming store of evidence which so explicitly tends to support the Commission's findings, those who attack such findings must make a showing that, nevertheless, such evidence has been so negated by other evidence in the record that the Commission was compelled to reject the former in favor of the latter. Cf. *Swayne & Hoyt, Ltd.* v. *United States*, 300 U. S. 297, 303-304.[102]

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[100] E.g., appellants' contentions relating to the Commission's findings concerning the adequacy of CBS brightness and to RCA's equipment considerations (Br., pp. 61-64, 75-80).

[101] See *National Broadcasting Co.* v. *United States*, 319 U. S. 190; *Federal Security Administrator* v. *Quaker Oats Co.*, 318 U. S. 218, 228; *Opp Cotton Mills v. Administrator*, 312 U. S. 126, 156.

[102] The *Universal Camera* case, No. 40, this Term *supra*, does not, of course, alter this well-established rule. On the contrary, in that case, this Court explicitly reaffirmed that even where the scope of review is "substantial evidence on the record considered as a whole", such scope is not

> intended to negative the function of the Labor Board as one of those agencies presumably equipped or informed by ex-

Plainly, appellants' own brief shows on its face that they have not met this burden nor, since they have altogether ignored the supporting evidence, have they even undertaken to meet this burden. Hence there is not, in fact, a genuine substantial evidence issue before this Court. Clearly, therefore, their contentions on this score must be rejected.

B. The Commission's Choice of Criteria for Adoption of a Color System Was Reasonable.

In its First Report (Par. 122, R. 155), the Commission set out a series of minimum criteria which a color system must meet "to be considered eligible for adoption."[103] Appellants contend (Br., pp. 84-97) that the Commission erred in omitting a number of other criteria which, appellants urge, are "more important" than those included by the Commission. While appellants treat this issue as a question of substantial evidence, contending that "There is no support in the record" for these alleged omissions, it is obvious that the only issue thus raised is the reasonableness of the Commission's choice of criteria and of the weight which it gave to various factors in selecting a color system. Plainly, the Commission's action in the premises was wholly reasonable.

(a). *Resolution; picture size; flicker-brightness.* Appellants complain (Br., pp. 89-95) that the Commission improperly omitted any requirements "that the resolution afforded by a color system be of high quality" and that the Commission did not sufficiently emphasize the importance of

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perience to deal with a specialized field of knowledge, whose findings within that field carry the authority of an expertness which courts do not possess and therefore must respect. Nor does it mean that even as to matters not requiring expertise a court may displace the Board's choice between two fairly conflicting views, even though the court would justifiably have made a different choice had the matter been before it *de novo*.

[103] These criteria appear herein *supra*, note 18, p. 14.

larger picture size and the "flicker-brightness relationship." The Commission's careful discussion of these issues and the evidence supporting its findings relative to them[104] clearly establish that its treatment of these factors was a proper and reasonable exercise of its discretion.

In respect of its treatment of resolution, it is to be noted that the Commission included among its criteria (First Report, Par. 122, R. 155) the requirement that a color system ". . . be capable of producing a color picture which . . . has adequate apparent definition . . ." Since the record shows that, as the Commission found, resolution is only one of the factors contributing to the definition of a picture (*supra*, pp. 79-81), and since it also shows that the definition of the CBS picture was entirely adequate (*supra*, pp. 81-82), it was hardly capricious of the Commission not to insist on some indefinite standard of high geometric resolution, the added contribution of which to an already satisfactory picture would clearly be academic.[105] In any event, the evidence in the record squarely supports the Commission's emphasis on over-all definition rather than on mere geometric resolution, which is one of its components.[106]

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[104] The Commission's findings and conclusions concerning resolution appear in its First Report, Par. 88, 90 and 143 (R. 142, 163) (see *supra*, pp. 18-19, 22); paragraph 144 of the First Report (R. 164) (see *supra*, pp. 20, 22-23) and paragraph 12 of the Second Report (R. 418) deal with picture size; and paragraphs 55, 58-60, 65-66, 72, 74-75 and 142 (R. 129, 130, 132-3, 135, 136, 163) of the First Report deal with flicker and brightness (see *supra*, pp. 16-17, 22). The relevant evidence supporting these findings is summarized at pp. 74-83, *supra*.

[105] Appellants' reference (Br., pp.90-91) to a speech by the Chairman of the Commission in which he is asserted to have "acknowledged the detrimental effect of a lowering of standards" illustrates the extraordinary dangers of citing materials which are not only outside the record but are torn out of context. The speech referred to did not deal with resolution or with engineering standards at all. It dealt only with the Chairman's concern about the standards of *programs*—their quality and their conformity with good taste.

[106] For references to the testimony establishing that geometric resolution is only one of a variety of factors contributing to the

Similarly, it is plain that the Commission was neither arbitrary nor capricious in its refusal to insist, as a condition to adopting a color system, that its present receiver apparatus must be able to produce direct view pictures in excess of 12½ inches. Obviously, this is a matter within the particular province of the Commission. And the record amply supports its action in the premises—if such support be needed. For as already noted (*supra*, note 37, p. 29) a public reaction survey showed an overwhelming preference for 12½ inch color pictures to 16 inch black and white pictures. In another survey, less than one per cent of the thousands of persons who viewed the CBS color picture on 10 inch and 12½ inch receivers noted "miscellaneous receiver defects" which included, among other things, "screen too small" (Ex. 348, Table 6c; Ex. 349, Table 6c). And finally, Dr. Engstrom, RCA's own witness, was asked whether he thought "that it is reasonable to assume that the public, to get color started, might want to choose a different sized picture in color in competition with a large black and white picture" (Tr. 10891-2). He replied (Tr. 10892): "I am not sure that is basic except that I am sure that their appetite has been whetted by the larger black

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definition of a picture, see *supra*, p. 79. The record also explicitly establishes that the public and set manufacturers themselves are not greatly concerned with, and do not take advantage of, high geometric resolution (Tr. 2392, 2403-10, 3187, 5480, 6599, 7988, 8100, 10646-7, 10672-3.) The record shows, too, that there are markedly diminishing returns in respect of geometric resolution, and that the differences between a 405 line picture produced under the CBS system and a 525 line picture are not readily discernible on subject matter (Tr. 3186-8, 3197-8, 3269-73, 3312-5, 6626, 7882, 8893, 9575-8, 10897-8, 11219-23; Ex. 214). For example, Donald Fink testified (Tr. 8006-7): "... I think it has been reasonably well assumed you can change the number of lines by a factor of about 50 per cent for a given band width without any substantial change in the subjective sharpness of the picture. That was established many years ago by Baldwin, and I think it is generally considered to be the true fact by everybody."

and white picture, and they would also like larger pictures in color, relatively."[107]

Nor does appellants' contention (Br., p. 95) that the Commission's criteria "fail to give proper recognition to the importance of the flicker-brightness relationship" raise any serious question. The third criterion specified by the Commission for a color system (First Report, Par. 122, R. 155), is that:

> The color picture must be sufficiently bright so as to permit an adequate contrast range and so as to be capable of being viewed under normal home conditions without objectionable flicker.

As already noted (*supra*, pp. 16-17, 22, 74-79), the Commission explicitly found that the CBS picture met this criterion, and its findings are amply supported. In these circumstances, it can hardly be said to be unreasonable for the Commission not to have insisted, as a condition precedent to the adoption of a color system, that a system meet some academic criterion of brightness which is greater than is needed. For, plainly, it is enough if the system be capable of sufficient brightness, without flicker, for normal home use.

(b) *"Effectiveness of channel utilization."* Appellants contend (Br., p. 96) that the Commission fatally erred in not including among its criteria the factor of "effectiveness of channel utilization". But the argument is wholly academic. Whatever the theoretical performance of the RCA system, it is plain that it would hardly constitute an effective utilization of channels to permit devotion of scarce

[107] Compare also the testimony of David Sarnoff, the Chairman of the Board of RCA, who stated in 1940, when he was advocating prompt adoption of black and white standards (Tr. 10387), that "I submit that a greater public interest will be served at this time by research toward the methods that would extend television service to as many homes as possible rather than in improvements that would merely add to the size . . . of the picture now enjoyed by the few" (Tr. 10390).

spectrum space to a color system which, as the Commission found, produces an unsatisfactory color picture on a receiver which is too complex for the public to work and too costly for it to buy. The heart of the Commission's inquiry was which, if any, of the systems proposed were satisfactory. In evaluating the systems, and evaluating the evidence, the Commission was dealing with the very issue which appellants contend it omitted—viz., effective channel utilization. For, obviously, that system which best meets all the criteria also most effectively utilizes the spectrum space. Accordingly, it was scarcely necessary for the Commission to list this criterion, or otherwise deal with it, for the sum of all the parts constitute the final whole of effective channel utilization.[108]

(c) *Compatibility.* Appellants' most vigorous attack on the reasonableness of the adoption of the field sequential system centers on the fact that that system is incompatible, an issue which appellants treat throughout their brief (e.g., pp. 2-4, 9-12, 17-18, 41-52, 84-89). They stress the advantages of a compatible system the color transmissions of which can be received on existing black and white sets as a black and white picture. They urge that the fact that field sequential system transmissions cannot be received on such sets unless the sets are first adapted should have served without more, to disqualify that system, and that the Commission's refusal to accept this view was so arbitrary, unreasonable and contrary to the public interest that the action of the Commission must be enjoined.

Appellants' contention on this score, however, altogether ignores the context of the issue. It ignores the overriding

[108] It is interesting to note also that David B. Smith testified (Tr. 8262-4) that because of RCA's excessive susceptibility to oscillator radiation, it might be necessary to rearrange the spacing of television stations among various communities and thus reduce the number of stations which would otherwise be possible. See also *infra*, pp. 106-107. Obviously, if the RCA system would thus require reduced overall television service, there would be a less effective channel utilization.

fact, supported so firmly by the evidence, that no successful compatible system has been developed and that there is no reasonable probability that such a system will be developed. It further ignores the fact that, while incompatible, the field sequential system is the only system which gives present and future assurance of satisfactory *color* performance. It also ignores the fact that only under the CBS field sequential system is it feasible for existing set owners to receive *color* pictures by converting their sets,[109] while under the RCA dot sequential system, existing set owners can not receive *color* pictures on their sets, which are incapable of being converted (see *supra*, pp. 12, 20).

In essence, therefore, appellants must contend that the basic condition of a *color* television system is that it must produce *black and white* television pictures on existing receivers without change, and that a system which lacks this feature must be rejected irrespective of its ability to furnish a satisfactory *color* service both to existing set owners who wish to convert their sets and to new purchasers who wish to buy a color set. Receiving color transmissions in black and white on existing sets, appellants contend therefore, is more important than color itself.

The Commission, in its Reports, carefully considered this contention, and rejected it. In explicitly excluding compatibility as a criterion for eligibility for adoption of a color system, the Commission noted that "if a satisfactory compatible system were available, it would certainly be

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[109] In this connection, it is to be noted that the brief of Local 1031 (which, in any event, is entirely devoid of any transcript references and which candidly pitches its arguments on matters wholly outside the record) is mistaken in asserting that under the CBS system, no black and white sets of a picture size larger than 12½ inches can be converted. The record explicitly establishes to the contrary. It shows that black and white receivers can be converted regardless of their picture size, although the viewed color picture may have to be reduced to 10, 12½, or 16 inches (Tr. 3448, 9000, 9135). Such a reduction in size of the color picture does not affect the original size of the black and white picture (Tr. 9148).

desirable to adopt such a system" (First Report, Par. 123, R. 156). But the Commission further pointed out (*id.*):

> . . . no satisfactory compatible system was demonstrated in these proceedings and the Commission is of the opinion, based upon a study of the history of color development over the past ten years, that from a technical point of view *compatibility, as represented by all color television systems which have been demonstrated to date, is too high a price to put on color.* In order to make these systems compatible, the alternatives have been either an unsatisfactory system from the standpoint of picture quality, or a complex system, or both. A complex color system will have such formidable obstacles in its path that there is no assurance it would be acceptable to the American public. The Commission is compelled to reach the conclusion that no satisfactory compatible system has been developed (First Report, Par. 123, R. 156) [Italics supplied].

Further, as the Commission noted (First Report, Par. 124, R. 156), the problem of receipt of color transmissions by black and white receivers is merely a temporary problem which will decrease progressively once color standards are adopted and receivers are built so as to be capable of receiving such new standards.[110] Moreover, even the present owners of black and white sets could either spend the "relatively minor amount of money necessary to adapt their sets" or, if they did not choose to do so, they would continue to receive the programs which would be broadcast under present black and white standards. Hence, the Commission concluded (First Report, Par. 124, R. 157):

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[110] Thus the Commission assumed that there were 7,000,000 black and white sets then in the hands of the public. It stated that if sets were continued to be manufactured at the rate of five to six million a year, then one year after the adoption of color standards, 40 percent of the receivers should be capable of receiving field sequential color transmissions; this percentage would become larger each year (First Report, Par. 124, R. 156).

> It would not be in the public interest to deprive forty million American families of color television in order to spare the owners of seven million sets the expense required for adaptation.[111]

Thus, plainly, the Commission's Report shows on its face that its conclusion that compatibility should not be a *sine qua non* of adoption of a color system was not whimsical, arbitrary or capricious, but, on the contrary, was the result of careful analysis and consideration and was wholly reasonable.[112] For, as it noted, the choice which, in essence,

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[111] It is to be noted that present black and white television is limited to that portion of the spectrum known as "very high frequencies" (VHF) and to a relatively few major metropolitan areas. Since 1948, the Commission has imposed a "freeze" on granting new television broadcast licenses in order to study further the general problem of interference and allocations of channels, and to determine whether an additional portion of the spectrum, known as the "ultra high frequencies" (UHF) should also be made available to television. Indeed, the color hearings were a phase of the hearings involving these other issues. Thus, it will be seen that the problem created by the ownership of existing black and white sets is limited both numerically and geographically. Only 63 geographic points now have television service; there are 1336 other points for which stations are contemplated but in which there are now no stations (Ex. 393, Tr. 8719).

[112] It is true, as appellants point out (Br., pp. 19-20, 88) that many witnesses representing manufacturers of black and white sets urged that the Commission insist on compatibility. But it is to be noted that many of these same witnesses had, in 1946-1947, also supported RCA's "simultaneous" system on the ground of its alleged compatibility (see D. B. Smith, Tr. 8401; DuMont, Tr. 9402; statement of Commission Counsel, Tr. 9966); yet that system never survived field testing (First Report, Par. 139, R. 163).

But, in any event, there is explicit evidence (if such be needed) to support the Committee's conclusion concerning compatibility. Thus, it is significant that Dr. Charles W. Geer, one of the few witnesses wholly unconnected either with the broadcasting or black and white television manufacturing industry, testified (Tr. 3933) that: "I would not put compatibility above color itself" and that if it were not possible to have color with compatibility, he would prefer to have it without compatibility rather than have no color at all. For other testimony (by CBS witnesses) urging that compatibility not be made a condition to adoption of a system, see Tr. 2992-3, 6254-5, 7181, 8643-4, 8718, 8722, 9368.

it faced was between color and compatibility. On the basis of the hearings and its ten years of experience in dealing with color, it concluded that there was, at the least, great uncertainty whether the objective of compatibility was not itself inconsistent with the objective of a satisfactory color system. As the Commission stated, the price of compatibility in each compatible system thus far considered has been either excessive complexity or unsatisfactory pictures, or both—a conclusion not only plainly supported by the findings concerning the RCA and CTI systems but also by explicit testimony concerning the compromises in other directions which compatibility compels (see Tr. 4497).[113]

Since, therefore, as the Commission found, the defects in the RCA compatible system were such that no remedy in the foreseeable future was assured, since color was found to be a "fundamental" improvement, since the CBS system was the only system which was found to be satisfactory, and since in any event, the compatibility problem was found only to be an interim transitional problem which would progressively decrease with the passage of time, it is clear that the Commission's determination not to deprive the public of a satisfactory color system for an indefinitely long period in the future, and perhaps forever, solely because that system is incompatible, is plainly not unreasonable. Rather it was a determination, involving a host of factors hinging on both present performance and expert judgments concerning the future, which the Commission was particularly established by the Congress to make. Firmly founded in reason as its determination is, therefore, the determination is decisive here.

Appellants suggest further, however (Br., pp. 43-45, 100-101, 107; see also pp. 49-50), that the Commission's adop-

[113] It is to be noted that many of the defects which the Commission found to exist in the RCA system were expressly attributed by it to the use of mixed highs, to dot interlace, to extremely critical tolerances, to cross-talk and to other essential elements of the RCA system which are present because of its effort to achieve compatibility (see First Report, Par. 45-52, R. 122-7).

tion of color television standards which are incompatible with black and white television standards[114] is a departure from principles enunciated by the Commission in the past, and that such principles having become engrafted on the Communications Act of 1934 by administrative construction, the Commission is now without power to adopt an incompatible system.[115] Even assuming the correctness of appellants' legal theory that the principle of administrative construction is applicable in such circumstances, it is plain that appellants are wholly in error on their reading of such construction. For it is clear that the principle of a single set of standards for both color and black and white television has not only never been enunciated by the Commission but, on the contrary, has been explicitly repudiated by it whenever the issue has arisen.[116]

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[114] Appellants choose to characterize this as an adoption of "multiple standards". But, of course, "multiple standards", as used in these proceedings (see *infra*, pp. 103-113), has always been used to refer to different sets of standards for the *same* television service (*i.e.*, two sets of standards for black and white service, or two sets of standards for color service).

[115] Appellants also appear to advance a similar argument (Br., pp. 46-51) that adoption of the CBS system also constitutes a departure from other general principles (*viz.*,—adoption of standards should, under the standards, leave "room for improvement" and standards should not be set "prematurely") and hence is beyond the power of the Commission. The short answer is that, as appears from its findings and conclusions, adoption of CBS standards was entirely consistent with these principles—assuming that the principles have such specificity of content that they can become a part of the statute by administrative construction. For the Commission noted the possibilities of future improvement which would be usable with the CBS system (*i.e.*, long persistence phosphors, horizontal interlace and the tri-color tube). And clearly the Commission did not violate any principle against "premature" setting of standards, since it found that the CBS system was ready to be adopted now.

[116] Indeed, of course, the standards for the RCA color system are not the same as present black and white standards. (See appellants' brief, p. 99.) Hence if the RCA system were adopted, there would also be two sets of standards, one for RCA color and one for black and white. Further, appellants' contention that be-

Thus, appellants emphasize (Br., pp. 42-44) that in a Report issued by the Commission in 1940, the Commission pointed out that there should be a "standard gauge" for transmission standards so that "every transmitting station" will be enabled "to serve every receiver within its range." But in this Report, the Commission was dealing exclusively with the question of black and white television standards. There was no issue of color television before the Commission at that time, and hence the Commission was merely enunciating the principle, to which it always has adhered (see infra, pp. 105-106), that for any particular broadcast service, there should be only one set of standards.

In May 1941, the Commission for the first time had occasion to deal with the question of standards for color television, concurrently with its setting standards for black and white television. At that time, the Commission adopted transmission standards for black and white television of 525 lines, 30 frames and 60 fields. Simultaneously, the Commission proposed different standards for color television—375 lines, 60 frames, and 120 fields. (First Report, Par. 8-9, R. 102-4.) Hence from the beginning, the Commission contemplated different standards for the two services—so that all receivers would not necessarily be able to receive all signals transmitted.

Similarly, in 1947, when the Commission was next faced with the issue of color television standards, it again explicitly rejected the principle that such standards be the same as, or compatible with, the existing black and white standards. In its 1947 decision (11 F.C.C. 1523, R. 474), the Commission stated:

> . . . compatibility is an element to be considered, but of greater importance, if a choice must be made, is the

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cause of administrative construction, the Commission is without power to promulgate more than one set of standards cannot be squared with its contention (*infra*, pp. 103-113) that as a matter of law, the Commission was required to set "multiple standards" for color television.

development of the best possible system employing the narrowest possible bandwidth and which makes receivers capable of good performance at a reasonable price.

Thus, on the only two occasions when the issue was before it prior to the instant proceeding, the Commission enunciated the principle, precisely as it did in 1950, that compatibility between black and white standards and color standards was not necessary, and that different standards for each of the two services were not only permitted, but contemplated. Plainly, therefore, there is no such administrative construction as appellants contend which barred the Commission's adoption of an incompatible system.

C. The Commission's Action in Seeking a Means to Prevent the Aggravation of the Compatibility Problem in Order to Permit Further Consideration was Reasonable.

As described more fully above (pp. 23-28), the Commission could have, on the basis of its findings and conclusions, adopted standards for the field sequential system at the time of the First Report. But it decided not to do so. For the majority of the Commission concluded that it would be desirable to delay the adoption of color standards, provided that it proved possible to do so without substantial injury to the public, in order (1) to obtain further information concerning three recent developments (the tri-color tube, horizontal interlace and long persistence phosphors) which had not yet been fully tested or established, and the effect of such developments on the field sequential (CBS) system when used with it; and (2) to provide additional time for possible development and demonstration of new color systems and improvements in existing color systems which had been informally called to the Commission's attention after the record was closed. See Statement, *supra*, pp. 23-28. The Commission expressly recognized that none of these first three possible improvements were a pre-

requisite to the immediate adoption of the CBS color system and that this system was "at least as fully developed as was the black and white system" when it was adopted and standardized in 1941 (First Report, Par. 149, R. 166). It felt, however, that if some way could be devised to avoid the aggravation of the compatibility problem which, as indicated above, would otherwise result from further delay in adopting the CBS system, the writing of color television standards could profitably be deferred until further information with respect to each of these matters could be secured.[117]

The Commission stated that it thought it might be possible to achieve this objective if black and white transmission standards could be amended so as to include a "bracket" of transmission values and if the manufacturers of receiving equipment could incorporate into new sets,

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[117] As the Commission stated in its Second Report (Par. 6, R. 415):

The Commission did not in its First Report finally adopt the CBS color system. Instead, it set forth a procedure whereby, if the status quo on compatibility were maintained, a decision would be postponed so that the Commission could give further consideration to four matters—large-size direct-view tubes on the CBS system, horizontal interlace, long persistence phosphors, and the development of new compatible systems and improvements in existing compatible systems, which had been informally called to the Commission's attention since the conclusion of the hearing. It is obvious that some procedure had to be devised whereby the compatibility problem would not be aggravated if a decision were postponed. Otherwise, we would be in the position of inviting the risk that if, after postponing a decision, the compatible color systems should again fail to meet the minimum criteria for a color system, as they have failed in the past, the number of receivers in the hands of the public would have increased to such a point where, as a practical matter, it might not be practicable to adopt an incompatible color system even though we now know that such system meets all of the criteria for a color system. Hence, it is obvious that if a decision were to be postponed, a method had to be devised to maintain the status quo in compatibility so that when the time did arrive for making a decision, the Commission would be in relatively the same position as it is today—so far as compatibility is concerned—to adopt a successful incompatible system if all of the compatible systems again failed to meet the minimum criteria for a color system.

thereafter manufactured, means to receive transmissions broadcast under such "bracket standards". By these means, the purchasers of new sets would be able to receive black and white pictures from transmissions under both the existing monochrome standards and the field sequential system as well as under possible amended monochrome and field sequential standards (see *supra*, pp. 26-27). The Commission, therefore, requested comments concerning the feasibility of adopting bracket transmission standards; it simultaneously requested the television manufacturing industry to inform it whether the industry could and would build future television receivers capable of operating within brackets so as to receive, among other transmissions, field sequential color transmissions in black and white in addition to existing black and white transmissions. If this could be done without the necessity of holding hearings on the question of adopting such bracket standards, the Commission stated the compatibility problem would not become more serious during the period of postponement of a final decision, and hence more time could be taken to determine whether any additional improved techniques could be perfected. If, however, the compatibility problem could not be contained in this manner, the Commission stated that the adoption of the field sequential system could not be postponed in the hope of such improvements or the problematical perfection of a compatible system, for every day of delay would mean the production and sale to the public of the existing type of receiver incapable, without adaptation, of receiving transmissions under the CBS color system. As it noted, if, after such delay, no satisfactory compatible system were presented, the increased number of black and white sets in the hands of the public might eventually prevent the adoption of the only satisfactory color television system yet devised.

The response to the Commission's suggestion showed that bracket transmission standards could not, because of many questions raised, be adopted forthwith; it also showed

that the television manufacturers either could not or would not adopt bracket standards. No other suggestion was advanced by any of the parties as to how a final determination of the matter could be postponed without aggravating the compatibility problem. This meant that a final decision could not safely be postponed, and hence standards for the field sequential system were adopted.

The procedure thus adopted by the Commission, in the face of the "two difficult courses of action" which were open to it (First Report, Par. 145, R. 164), was, therefore, a wholly reasonable resolution of the problems which confronted it. It represented an exercise of administrative discretion which was particularly well designed to serve the public interest, and was typical of the very kind of flexibility which the administrative process is designed to permit.

Appellants wholly distort the action of the Commission in their characterization of it (Br., pp. 128-134; see also pp. 27-28) as an attempt to coerce manufacturers or to exert illegal jurisdiction over the manufacturing of receiving apparatus. The bracket standards proposal was clearly an exploratory suggestion and a request for information concerning whether such standards were feasible and whether the manufacturers could and would build future receivers capable of receiving transmissions under such standards. Of course, the Commission's jurisdiction extends to the standards of broadcast transmissions, not to the equipment built by receiver manufacturers. But it does not follow that the Commission must close its eyes to receiver performance in discharging its functions.[118] Thus, receiver selectivity determines such matters as allocations of channels among communities and interference ratios. To ask manufacturers of receivers if a certain type of equipment

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[118] Indeed, appellants in effect concede this, as they must, since as noted above, they have condemned the Commission's decision on the grounds, among others, that the CBS receivers utilize a disc and are limited in direct-view picture size.

can be built within a certain time, in connection with the question facing the Commission whether a final decision could safely be postponed, is not to coerce but rather to seek the very type of information which might be adduced in the course of any rule-making procedure.[119]

The actual effect of the proposal was to give a period of grace to the compatible systems. Since the Commission could have adopted the field sequential system forthwith, appellants can hardly allege injury from the fact that a plan was suggested by the Commission which would have postponed such adoption. Appellants have characterized as "illegal conditions" what in actuality was a discretionary postponement of a final decision. The Commission had decided to reject as unsatisfactory the dot sequential system and to adopt the field sequential system. The fact that the Commission sought information as to the manufacturers' willingness and ability to build sets capable of receiving bracket standard transmissions, which would have given RCA more time to improve its unsatisfactory system without precluding the adoption of the only known satisfactory system, is certainly not an illegal imposition. It is not appropriate for the very party who could derive only aid and assistance from the adoption of bracket standards so to characterize them. Cf. *Steward Machine Co.* v. *Davis*, 301 U. S. 548, 589-91; *Radio Cincinnati* v. *Federal Communications Commission*, 177 F. 2d 92, 95-96 (C. A. D. C.).

It is clear that the Commission's action, thus erroneously attacked, was reasonable and wholly within its powers. It was a carefully reasoned action based upon a full consid-

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[119] For an explanation of "bracket standards", see Statement, *supra*, pp. 26-27. It is further to be noted that the only proposal was to amend the black and white *transmitting* standards, and not, of course, to impose any requirement, by regulation or otherwise, that manufacturers build receivers which would be so designed as to be capable of receiving any transmissions under the bracket standards. There was never any suggestion that bracket standards would be made effective without hearing if comments substantially adverse to the proposal were received.

eration of all the relevant factors involved. It was an admittedly difficult decision, but one exactly of the nature which is within the informed competence of the administrative agency. It affords no ground whatever for condemning the order of the Commission.

D. The Commission Properly Refused to Adopt Transmission Standards Permitting Regular Broadcasting Under the RCA System.

In addition to their arguments that the Commission was in error in adopting standards for the CBS system, appellants contend (Br., pp. 97-113) that in any event, whether or not such standards were correctly adopted, the Commission could not properly refuse also to adopt standards for the RCA system in order that broadcasting under the latter system on a regular non-experimental basis might be permitted as well. Appellants thus contend that the Commission was obligated to adopt "multiple standards"—*i.e.*, more than one set of standards under which station licensees could broadcast under either the RCA system, the CBS system, or for that matter, presumably under any other system. The precise reach of their argument, however, is unclear. Apparently appellants concede (brief in the court below, pp. 32-34) that the Commission does have power to set standards and "RCA does not now challenge the Commission's assumption a decade ago of the power to set standards." Nevertheless, though thus conceding the power, appellants appear to contend alternatively either that the Communications Act does not permit establishment of only one set of standards or that, if it does, it was an abuse of discretion in this case to refuse to adopt multiple standards.[120]

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[120] This argument is, of course, squarely inconsistent with appellants' argument, discussed above at pp. 93-96, that as a matter of law the Commission was required to adopt a compatible system and a single set of standards for both color television and black and white television.

At the threshold of discussion of this point, it may be noted that appellants themselves appear implicitly to recognize that the issue of multiple standards does not even arise if the Commission properly found that the RCA color pictures are unsatisfactory. Thus, appellants argue (Br., pp. 107-108) as an essential element of their contentions concerning the Commission's asserted lack of power to refuse to set standards for the RCA system, in addition to the CBS system, that the color performance of the RCA system is in fact satisfactory. But such an argument flies in the face of the Commission's findings on the color performance of the RCA system—findings which, as shown above (pp. 53-60) are amply supported and hence are decisive here. Since, accordingly, it must be accepted as a fact that RCA's color performance is unsatisfactory, appellants' basic premise, on which its contentions concerning the Commission's obligation to approve standards for both RCA and CBS hinge, falls to the ground. And with it falls the contentions themselves.

If appellants' argument is to the contrary—that multiple standards must be adopted irrespective of the quality of RCA's color performance—appellants assume an unusually heavy burden. They must establish that the Act requires particular color standards to be established even though, as the Commission found, no satisfactory color broadcast service can be rendered under those standards. Consequently they ask this Court to accept this extraordinary proposition: that, as a matter of law, the Commission must adopt color standards for a system which it has found (1) does not produce satisfactory color pictures, (2) is not sufficiently field tested, (3) is excessively susceptible to certain kinds of interference, (4) requires complex and costly receiving equipment, and (5) although so much more difficult and costly to transmit, produces black and white pictures which are not even equal to those produced by standard black and white transmissions. Nothing whatever in the Communications Act nor in the scope of the "public interest, convenience, or necessity" criterion requires any such extraordinary result.

1. *The Commission has the power, under the Communications Act, to refuse to set standards for an unsatisfactory system.*—The Commission's statutory authority to establish a single set of standards for each broadcasting service is clear. The Communications Act of 1934, as amended, authorizes the Commission, among other things to "prescribe the nature of the service to be rendered by each class of licensed stations * * * " (Section 303(b)), to "regulate the kind of apparatus to be used with respect to its external effects and the purity and sharpness of the emissions from each station and from the apparatus therein" (Sec. 303(e)), and to adopt rules and regulations necessary to carry out the provisions of the Act (Sections 4(i) and 303 (r)).[121] These powers must be exercised "as public convenience, interest, or necessity requires" (Sec. 303, introductory clause). The Act, on its face, therefore, authorizes the Commission to set engineering standards for broadcast transmissions. Obviously, if it has such authority, it must have authority not only to select one set of standards but also to reject others. And the text of the Act further shows that, in determining what standards, if any, it shall establish, the Commission must of necessity take into account not only *transmissions* but also the effect of such transmissions at their destination, when they reach the public. For it must be plain that the purpose of the Act is not to regulate transmissions for broadcast service for their own sake; such

[121] Another objective of radio regulation is to "provide for experimental uses of frequencies" (Section 303(g)), and the Commission may in furtherance of this objective and to the extent that such action is in the public interest, license persons to carry on such experimentation. But authorizing persons, working to develop new radio techniques, to operate experimentally on frequencies assigned for that limited purpose—as RCA has been and currently is authorized to operate with respect to its experimentation with a dot sequential system of color television,—is far different from licensing persons to perform a regular broadcasting service "intended to be received by the public" (see Section 3(o) of the Communications Act).

transmissions would, so far as the public interest is concerned, be a matter of indifference, unless, as Section 3(o) of the Act states, they are "intended to be received by the public." Surely it would be futile for the Act to concern itself with the "nature of the service to be rendered" by a station, or with the "external effects and the purity and sharpness of the emissions from each station and from the apparatus therein" unless the service and the emissions to be regulated are intended for the public. And this is explicitly recognized in the overriding standard of the Commission's rule-making authority—*i. e.*, that such authority must be exercised in the *public* interest, convenience and necessity.

The text of the Act, so clearly establishing the Commission's authority to choose, in the public interest, among various possible standards of transmission and to adopt that set of standards which "renders" the best "service" and the greatest "purity and sharpness" of emissions—and to consider, in its choice, not only matters relating to the "key" of transmission but also the "lock" of reception—is confirmed by the legislative history of the Act. For in the debates on the Radio Act of 1927, which contained a Section 4(e) identical to Section 303(e) of the existing Communications Act, Senator Dill, manager of the bill in the Senate, expressly stated that this provision was intended to authorize the Commission, in its discretion, and to the extent that it determined the public interest would be served thereby, to permit or refuse to permit licensees to install and utilize particular types of transmitting equipment which would have the effect of requiring members of the general public to secure particular types of special receiving equipment necessary to receive such transmissions if they wished to do so. (68 Cong. Rec. 3033-3034; see also 68 Cong. Rec. 2880-2881.)

Subsequent to the enactment of Section 4(e) of the Radio Act of 1927, the Federal Radio Commission, charged with administering that Act, promulgated a single set of stand-

ards of AM radio transmissions[122] which, in effect, required all licensees engaged in radio broadcasting to conform to such standards, just as the proposed color television standards require all licensees broadcasting color television to conform to such proposed standards. The congressional reenactment of Section 4(e) of the Act of 1927, embodying it as Section 303(e) of the present Act (*supra*, p. 104), is, of course, congressional approval of the power, previously exercised under Section 4(e), to establish a single set of standards. Cf. *Helvering* v. *Winmill*, 305 U. S. 79; *Murphy Oil Co.* v. *Burnet*, 287 U. S. 299.

Not only the text of the Act itself and its legislative history thus establish the Commission's authority to act as it did, but the Commission's own administrative construction, followed over a long period of years,[123] similarly confirms such authority. For from the beginning, whenever the occasion has arisen for consideration of authorizing the regular broadcasting of a radio service, the Commission has established only a single set of standards. It did so for FM radio in 1940 (Part 3, Rules Governing Standard and High Frequency Broadcast Stations, Subpart B, Rules Covering High Frequency Broadcast Stations (5 F. R. 2382)). The Commission, in 1941, established a single set of standards for black and white television ("Report on March 20, 1941 Television Hearing" (Mimeo. 49851)). And it may be noted that such a single set of standards was set for black and white television in the face of violent disagreement among various segments of the industry as to which were the proper standards to be established (see Tr. 9526, 9535-8) and, in fact, in the face of a proposal that standards be so broadly established that more than one system could be transmitted under them (Tr. 9516-7). Thus,

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[122] Second Annual Report of Federal Radio Commission (1928), p. 20; Fourth Annual Report (1930), p. 59; Fifth Annual Report (1931), p. 6; Sixth Annual Report (1932), p. 28.

[123] Such construction is, of course, entitled to great weight. *United States* v. *American Trucking Associations*, 310 U. S. 534, 549; *Norwegian Nitrogen Products Co.* v. *United States*, 288 U. S. 294, 315.

as appellants themselves state (brief in court below, p. 32), it has long been "recognized in the industry that 'standardization of line and field rate was necessary to avoid a hodge-podge of different broadcasting *and receiving systems*" (italics supplied).

Appellants appear further to contend that the Commission is without authority to preclude adoption of RCA standards in addition to CBS standards, because the RCA system is compatible and hence can be received on existing black and white sets as black and white pictures. Therefore, appellants urge, the public would not be injured if licensed broadcast stations were permitted to broadcast under the RCA system. It is beyond the authority of the Commission, appellants state (Br., p. 110), to concern itself with the fact that some member of the public may wish to buy a RCA color set capable of receiving the RCA signals in whatever quality of color RCA signals can produce.

But the fallacy of this argument has already been demonstrated. At the threshold, the basic premise is erroneous: As noted (*supra*, p. 11), even the black and white pictures received from RCA color transmissions are somewhat inferior to standard black and white pictures. Surely if the Communications Act provides, as it has been shown it does, that the Commission's concern with the "purity and sharpness" of emissions is directly related to the public's receipt of such emissions, it is hardly in the public interest to permit licensees to drain their resources in complex and inoperable equipment in order to force on the public a substitute black and white picture which is inferior to that which the public is now receiving. Further, wholly aside from the question of the quality of the service under the RCA standards as a color or black and white service, the factor of oscillator radiation interference (see *supra*, pp. 11, 68-69) also must obviously be taken into consideration. For, as the record establishes, interference of this nature may well affect the number of channels, and the arrangement of channels among communities, which are to be assigned to

television—either black and white or color (Tr. 8260-4, 10655; cf. Tr. 7596).[124] Therefore, it is clear that even on the issue of interference itself, which appellants apparently concede may be taken into account in setting standards (Reply to Motion to Affirm, p. 22), the Commission plainly had power to refuse to adopt RCA standards.

In any event, appellants' argument, that since the RCA signal can be received in black and white, no one is injured because of the quality of the color, is disingenous. There can be no possible justification for adopting RCA color standards if the only purpose is to provide owners of black and white sets with black and white pictures. Obviously, appellants, by their very contention that RCA color standards must be adopted, necessarily assume that broadcasting under such standards would result in the

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[124] Appellants' contention throughout this litigation that interference from oscillator radiation is irrelevant because the RCA system is *susceptible* to such interference, rather than *produces* such interference, is accordingly misleading. It is true that the RCA system does not produce the interference; the difficulty is that it is peculiarly affected by the interference radiated from other television receivers, diathermy machines and other instruments (see *supra*, pp. 11, 68-69). But, so far as the signal received by the public is concerned, it is immaterial whether the defects in the picture are caused by the interference caused *by* the signal, or caused *to* the signal. Both cause and effect are inseparable parts of the problem of interference. Since the interference caused by oscillator radiation falls on specific points in the spectrum, and hence on specific channels, it thus interferes with the television signals being transmitted in those channels. Hence, as noted in the text, a major method of minimizing such interference would be to rearrange the channels which can be assigned to communities so as to remove those in which the interference falls. Adoption of the RCA system, with its excessive susceptibility to such interference, would more certainly require such rearrangement and such rearrangement would *result in a lesser total number of channels available to television service as a whole* (Tr. 8260-4, 10655). Thus, the public may indeed be hurt by RCA's interference characteristics since, by requiring a reduction in the total number of channels (and hence, of course, of stations), the public in particular communities would be deprived of service which it otherwise might have.

purchase of sets which are supposed to receive the color transmissions *in color*. And authorization of regular commercial operation under such a system certainly will induce the public to invest substantial sums in receiving equipment for a system of color television which is not, and may never be, capable of producing satisfactory color pictures. Moreover, as a result of further experimentation and development and further changes in the system of producing color pictures, all sets capable of receiving RCA's present color pictures may be rendered totally obsolete. The Commission's regulatory powers to license broadcasting stations to serve the public, and to regulate the kind of transmitting apparatus to be used, cannot be tortured into a legislative prescription of the rule of *caveat emptor*.[125] Indeed, as has been shown above (p. 104) the legislative history of the Act establishes that one of the very purposes of Section 303(e) was to empower the Commission to weigh the effect of transmissions on the purchase of receivers and protect the public in such purchases to the extent that they are related to the signal transmitted.

2. *The establishment of a single standard is consistent with the Commission's statutory duty to foster competition.*—In large part, appellants' contention that the Commission can not properly refuse to adopt standards for the RCA system side by side with standards for the CBS system turns on their argument that the Commission's adop-

[125] Appellants' claim (Br., p. 109) that since the Commission has no direct jurisdiction over the manufacture of radio equipment, it thus has no concern with the types of receiving equipment which the public may, in its discretion, choose to purchase, is indeed an astounding position in view of the fact that their case against the adoption of the CBS color system is so heavily based on the adaptation and conversion costs to those members of the public who presently own black and white sets and on the asserted picture size limitations of the CBS disc receivers. But, in any event, it is clear that the fact that the Commission must inevitably consider receiver performance in fixing transmission equipment standards does not at all mean that it is exercising illegal jurisdiction over receiver manufacturing.

tion of single standards transgresses the policy of the Communications Act to foster competition. This argument not only ignores the unbroken history of the Commission's setting of single standards for each broadcasting service, but it is also squarely inconsistent with the position which appellant RCA took before the Commission. Thus, the chairman of the Board of Directors of appellant RCA testified (Tr. 10300) that adoption of single standards would provide greater inducement for research and development in color television than adoption of multiple standards because "... I feel that under the adoption of a single standard the state of the industry would be more healthy ..."[126]

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[126] Appellants, on the same issue, now take precisely the opposite view. In their brief (p. 105), they now urge that adoption of single standards "involves the stultification of the priceless national resource of invention and research" Apparently, appellants' argument comes to nothing more than that multiple standards are required by the objective of competition if CBS standards are adopted, but that the Communications Act is indifferent to competition if single standards for the RCA system alone are adopted. Indeed, at an earlier point in his testimony, the chairman of the RCA Board had advocated precisely this "double standard" of determining whether multiple standards should be adopted. On cross-examination by Commission counsel, the following colloquy took place (Tr. 10093-10094):

"Q. Are you in favor of the Commission adopting multiple standards in this proceeding or not?

A. Well, I haven't recommended it, I would say that the question of whether I was in favor of it or not would depend to a large extent on whether it had abandoned its idea of a single system.

Q. Would you recommend the Commission to abandon its idea of a single system?

A. No. I recommended that it adopt the RCA system.

Q. Correct. And if the Commission adopts the RCA system you certainly wouldn't recommend that we also standardize on the basis of any other system?

A. No, I don't.

Q. Suppose the Commission does not adopt the RCA but adopts the CTI or CBS system.

A. Then I would recommend multiple standards in preference to that."

But, in any event, appellants are mistaken in their present contention (Br., pp. 101, 102, 106, 108) that the adoption of a single set of standards for color is forbidden because it assertedly fosters monopoly and hence transgresses the policy of the Communications Act to establish the maximum possible competition. For, as has been established in the preceding discussion, the Act plainly does permit establishing a single set of standards for each broadcasting service. Appellants' argument concerning "monopoly" ignores the nature of the subject matter which requires adoption of standards and the nature of the competition which the Commission is under an affirmative duty to promote. The limitations on the free use of radio frequencies which requires the setting of transmission standards by the Commission are imposed by the scarcity of frequencies and the need for regulation to prevent chaos in their use. In this manner, the most effective utilization of frequencies from the standpoint of technical considerations and the protection of the interest of the public as users of equipment is insured. The very purpose of the enactment of the Radio Act of 1927, 44 Stat. 1162, the basic provisions of which are incorporated in the Communications Act, was elimination of *laissez faire* in the choice of frequencies, transmission characteristics and other operating conditions which had actually led to chaos in the radio spectrum. See *National Broadcasting Company* v. *United States*, 319 U. S. 190, 211-214. The promotion of competition in order to insure maximum utilization of frequencies in the public interest is indeed a major purpose of the Communications Act. *Id.*, at 224. But *Federal Communications Commission* v. *Sanders Radio Station*, 309 U. S. 470, 474-5, mistakenly relied on by appellants (Br., pp. 101-102), makes clear that the type of competition which is calculated to achieve that objective is not the unregulated competition of superior and inferior means of signal transmissions, but rather the competition between licensees using authorized and standardized means of trans-

mission for the attention of the listening and viewing public. It is obvious enough that multiple standards for the same type of service does not expand but, rather, diminishes this type of competition in circumstances where possible reception from all stations in a given area would require that the potential listener or viewer have more than one receiving set or a combination set of prohibitive expense and complexity.

3. *The Commission was not required to make findings on the issue of "multiple standards."* It is clear from the foregoing that the Communications Act, far from requiring the Commission to adopt RCA standards, plainly contemplated authorizing the Commission to refuse to adopt standards on the very grounds on which the Commission rejected the RCA system. And, therefore, it is equally apparent that the Commission, in refusing to adopt standards for the RCA system, in addition to adopting standards for the CBS system, did not abuse its discretion but, on the contrary, acted entirely reasonably.[127] For certainly the Commission cannot be said to have been arbitrary and capricious in refusing to authorize a system in which, as the Commission found, so many defects inhered.

The short answer to the complaint (Br., pp. 103-106, 111-112) that the Commission made no finding concerning the technical feasibility or general desirability of adopting standards for more than one system is that no findings were

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[127] A comprehensive statement of the dangers of, and injury caused by, multiple standards appears in the testimony of Frank Stanton, President of CBS, at Tr. 7116-34, 7219-20. Briefly summarized, his testimony shows that multiple standards would delay the introduction of color; would work a hardship on the public; would cause consumer confusion because of requiring a consumer to make his choice of programs in advance, at the time of purchase; would result in the consumer's getting only some color broadcasts, and not all; and would not result in "choice in the market place" but rather would place control of which standards are to be used in the hands of a few broadcasters and manufacturers. See also colloquy between Stanton and Commissioner Webster at Tr. 7168-71 establishing the adverse effects on station relationships and on the public if a station chose to shift from one set of color standards to another.

necessary or even called for since the Commission had found that the RCA system was so deficient that it was not in the public interest to adopt standards for it and, hence, the issue of multiple standards was never presented for decision. In other words, the Commission never reached the question whether, if the RCA system were otherwise satisfactory, standards for both RCA and CBS should be established.[128]

Not only was the issue of "multiple standards" not presented by the facts; it was, moreover, not really tendered by the parties. For the witnesses who testified on the issue before the Commission were virtually unanimous in their

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[128] It is for this reason that appellants' references to the decisions of this Court in *Jacob Siegel Co.* v. *Federal Trade Commission*, 327 U. S. 608, and *Securities and Exchange Commission* v. *Chenery Corporation*, 318 U. S. 80, are clearly beside the point. Aside from the fact that appellants are here complaining of a failure to make findings on an issue never posed by appellants to the Commission (se, *infra*, p. 113), those cases are readily distinguishable. If the Commission had found that both the CBS and RCA proposals met the criteria of an adequate color television system, it might possibly be argued that in the light of the *Siegel* case, it was error to fail to consider the question of multiple standards and to make findings and conclusions upon this matter. But, in the light of the Commission's determination that the RCA system did not meet the minimum prerequisites of an adequate color system, there was no occasion to consider whether regular operation by broadcast stations using the RCA system should also have been authorized. "No formal or direct comparison is necessary between an application [for a broadcast license] which must be denied and one which may be granted. Relative consideration is meaningless unless there are two applications either of which, considered alone, might be granted." *Simmons* v. *Federal Communications Commission*, 145 F. 2d 578, 579 (C. A. D. C.); 169 F. 2d 670, 672 (C. A. D. C.), certiorari denied 335 U. S. 846. Similarly, there is no *Chenery* issue raised by the fact that the Commission in its brief has answered the arguments made by the appellants for the first time in the court below, and never made before the Commission, with respect to simultaneous operation of both the CBS and RCA system of color television transmission—a proposal which RCA not only did not formally present in the proceedings before the Commission (*infra*, note 130, p .112), but indeed, opposed (*supra*, p. 109), and which, in any event, need not have been reached in view of the finding that the RCA system was inadequate.

condemnation of multiple standards as impractical and confusing alike to the public and to the broadcasters. See Tr. 9685-6 (Baker); Tr. 9412, 9416 (DuMont); Tr. 8173-5 (D. B. Smith); Tr. 4701 (Lippincott); Tr. 11341 (Matthews); Tr. 7116-34, 7216-20 (Stanton).[129] In fact, as noted above (p. 109), the Chairman of the Board of appellant RCA himself explicitly testified (Tr. 10300) that "... I feel that under the adoption of a single standard the state of the industry would be more healthy, ...".[130]

It is readily apparent from the foregoing, therefore, that the Commission had clear power to refuse to adopt standards for the RCA system and that its exercise of that power was wholly reasonable.

E. The Court Below Properly Sustained the Commission's Order.

Resisting what it characterized as the insistence of the Government and the Columbia Broadcasting System that the Commission's order be allowed to become effective even before it "could have an opportunity to study and decide the issues presented" (R. 877), the court below, after

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[129] Appellants' attempt in the court below to show that these witnesses (other than Stanton) opposed multiple standards because they opposed standards for the CBS system is unwarranted. The testimony cited in the text establishes that while many of the witnesses opposed adoption of CBS standards, their opposition to multiple standards was based on independent criticisms of such multiple standards.

[130] It is significant also that although the Commission's Notice of May 10, 1950, stated that any proposed findings and conclusions filed by a party to the proceedings should include a "precise statement of the specific transmission standards proposed" (Tr. 1423), RCA did not propose that multiple standards should be adopted in its Proposed Findings and Conclusions. (Tr. 15748). CBS expressly recommended against the adoption of such multiple standards in its Proposed Findings and Conclusions (Tr. 15692), and while RCA did take explicit issue with many other findings, conclusions and recommendations proposed by CBS, RCA did not take issue with this recommendation in its lengthy Reply to the Proposed Findings and Conclusions of CBS (Tr. 15960).

three days of oral argument (R. 864) took this case under advisement on November 16, 1950, kept it under consideration for more than five weeks, and rendered a decision on December 22, 1950, explained in an opinion occupying 17 record pages in the record in this Court (R. 863, 864, 863-879).

That opinion (which the court below was, of course, not required to write)[131] fully canvassed the issues tendered the court for decision with but a few minor exceptions hereafter to be noted. It first set out at length a statement of the case, the parties involved, the statutory basis for its jurisdiction and that of the Commission. After noting that it had entered an order suspending the Commission's order on the basis of findings of fact made by it, the court proceeded to classify the arguments made in support of the appellants' request that the order of the Commission "be set aside" (R. 865). The two "general categories" of contentions which, the court said, embraced "many subsidiary issues" were "(1) that the order is contrary to the public interest, and (2) that its adoption represents an arbitrary and capricious attitude on the part of the Commission" (R. 865).[132]

With respect to the contentions thus classified, the court below, referring to the "many hours of oral argument by able counsel," its own "reading and study of the numerous and voluminous briefs," and its own study of "the case," pointed out that it "must give recognition to our limited scope in reviewing an order of an administrative agency"

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[131] ". . . it needs nothing but statement of the proposition to demonstrate the want of all foundation for the contention that there is ground for reversing the trial court because the court below affirmed the action of that court without opinion." *Tex. & Pac. Ry.* v. *Hill*, 237 U. S. 208, 215.

[132] Mention was also made of the attack on the standing to sue of the complaining parties and intervenors other than RCA, but, for purposes of its decision, the court decided to assume such standing (R. 866).

(R. 866).[133] It then proceeded to cite and discuss three "recent Supreme Court opinions" which contained typical statements of the limitations on the power of a court reviewing administrative action.

In these cases it found a general and, we think, sufficient answer to appellants' two "general categories" of argument: it found its "scope of review" firmly delineated so that it was, in the words of this Court, quoted by the court below,[134] "not at liberty to substitute its own discretion for that of administrative officers who have kept within the bounds of their administrative powers. * * * Error or unwisdom is not equivalent to abuse." (R. 866).

Thus guided, the court below proceeded to a fairly detailed statement of "the proceedings which culminated in the order under attack" (R. 867). From that statement, it concluded that "while the findings of the Commission are severely criticized, it is not contended in the main that they are not supported by substantial evidence" (R. 871). And the accuracy of that statement is not only readily apparent from the briefs and arguments of appellants in the court below;[135] it is also demonstrated by the nature of

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[133] The court at this point also referred to its inability to free its mind of the fact that its proceedings were "little more than a practice session" in view of the inevitable appeal to this Court. This comment and another similar statement in the court's opinion is discussed, *infra*, pp. 117-121.

[134] *American Telephone & Telegraph Co.* v. *United States*, 299 U. S. 232, 236.

[135] Analysis of appellants' briefs and arguments (filed as part of the record in this Court) in the court below establish the accuracy of the court's characterization of appellants' attack on the findings and, indeed, establish that no attack on findings was made which would have required the attention of the court. While in their main brief appellants included a point headed "The Order is Not Supported by Substantial Evidence" (p. 52), the material included in the point (pp. 52-63) comprised only an attack on the wisdom of the Commission's choice of criteria; no findings were identified as lacking in supporting evidence. At the argument before the court, appellants dealt with the substantial evidence issue only by referring the court to their brief (transcript of proceedings be-

their contentions in this Court which we have analyzed above, pp. 83-85.[136]

Turning to "the merits of the case", the court below stated, that the "major portion" of appellants' argument "is predicated upon matters outside the record made before the Commission" (R. 872). Such matters, the court ruled (R. 872), were

> not properly before the court. A consideration of such matters would in effect amount to a trial de novo, which we are without power to grant.[137]

The court below did not again specifically advert to the charge that substantial evidence was lacking for some of the Commission's findings. For, from the sentences in its opinion immediately following the statement that there was "in the main" no substantial evidence attack,[138] it is apparent that it found this attack "most plausible" only if

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fore the court below, p. 96). In their reply brief, filed after the argument, a few citations were included, but there was no attempt whatever to attack the evidence which supported the Commission's findings.

[136] In their brief (p. 137), appellants quote our motion to affirm as saying: "'* * * appellants urged in the Court below, and urge here, that there was no substantial supporting evidence * * *'". The Court should contrast this partial quotation with the full sentence from which it was taken (Motion to Affirm, p. 14): "Indeed, while appellants urged in the Court below, and urge here, that there was no substantial supporting evidence, they have failed to specify any of the multitude of findings alleged to be without such support."

[137] *Accord*: *National Broadcasting Co.* v. *United States*, 319 U. S. 190, 227.

[138] It is plain that the court below did all that was required of it in dealing with the appellants' evidentiary argument to the minor extent that their attack may actually have been on the issue of substantial evidence. For by its study of "the case" and its "reading and study of the numerous and voluminous briefs" (R. 866), it considered the issue on "the whole record *or such portions thereof as may be cited by any party* * * * [italics supplied]" as Section 10(e) of the Administrative Procedure Act requires it to do. See Appendix, *infra*, p. 155.

treated, not as an evidentiary argument, but a contention that subsequent developments after the hearings had closed had made the findings stale either as of the time the Commission's order was entered or when the hearings were held in the court below.[139] The charge, as the court below described it, was that the Commission had "abused its discretion in refusing to extend the effective date of its order so that it might further consider the situation, and particularly the improvement which it is claimed had been made by RCA and others" (R. 872).

This argument appears to have been the only contention found troublesome by the court below. For, after discussing and rejecting appellants' other complaints,[140] it returned to it, saying (R. 875):

> • • • as we evaluate the situation, there are two courses open, (1) to allow defendant's motion for a summary judgment, and (2) to vacate the order and send the proceedings back to the Commission for further consideration *in view of recent developments in the color television field as well as the rapidly changing economic situation.* [Italics supplied.]

The court below followed the first course. It rejected the second because, it said, "there may be doubt" of its power to pursue it and because adoption of such course "would inevitably result in the prolongation of the controversy which so badly needs the finality of decision which can be made only by the Supreme Court" (R. 875)[141]

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[139] What appellants' contention was is not clear.

[140] Among the items discussed by the court below were the Condon Report (R. 872), the subpoenas *duces tecum* sought by Pilot Radio Corporation (R. 873), and the participation in the proceedings of Chapin, a Commission engineer (R. 874). These matters are discussed in this brief at pp. 130-132, pp. 149-151, and pp. 143-149. The court below also again made reference to, and again rejected, the appellants' desire to introduce evidence which was not before the Commission (R. 874).

[141] This was merely a restatement of the court's earlier expressed inability "to free our minds of the question as to why we should devote the time and energy which the importance of the case merits,

The reasons thus stated by the court below for refusing to vacate the Commission's order certainly do not evidence any judicial abdication. The court below doubted its authority to vacate for further proceedings before the Commission and it resolved that doubt by refusing to vacate the Commission's order. That it took into account, in considering the question, the fact that the public interest would be served by having this issue resolved sooner rather than later[142] does not make its action error. Nor does consideration of the desirability of a quick and final decision of the issue evidence a failure on the part of the court below fully to consider the question of law thus presented by appellants' request for further consideration by the Commission in the light of alleged new developments.

Courts are not required to express a certainty of conviction that they do not feel; they are required only to resolve questions before them with such certainty as it is in their power to achieve.[143] This the court below did: As Judge Major said during the course of the oral argument below (Tr. of Proc. p. 330) "We have got to have time, and we are going to have time to give the question that is presented here our best thought; and some time in the as near future as we can reasonably, we will render the best decision that

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realizing as we must that the controversy can only be finally terminated by a decision of the Supreme Court." (R. 866).

The remainder of the opinion of the court below (R. 875-9) was devoted to the question of continuation of its stay order.

[142] Appellants had not sought a permanent injunction in the court below, insisting that they were not yet ready to do so, and that, therefore, the case was not yet ripe for final adjudication in their favor (Tr. of Proc. pp. 21, 39, 323-4).

[143] "* * * it must be owned that the law upon the subject is not free from doubt. * * * The situation is one in which to proceed by any available method would not be more likely to satisfy the impalpable standard, deliberately chosen, than that we adopted in the foregoing cases: that is, to resort to our own conjecture, fallible as we must recognize it to be." L. Hand, C. J., in *Schmidt* v. *United States*, 177 F. 2d 450, 451 (C.A. 2).

we are capable of rendering." Consequently, the cases cited by appellants (Br., p. 140) are all inapposite, for they were all cases in which the lower court, for good reason or bad, had failed entirely "to consider the case before it." *Lutcher & Moore Lumber Co.* v. *Knight*, 217 U. S. 257, 268.

Consequently, the language in the opinion of the court below is certainly not sufficient warrant for a remand to the court below to resolve its doubts on this question of legal authority.[144] There have indeed been many instances where this Court has itself decided questions of law, certainly no less difficult than that here involved, which were not considered at all by the courts below or even argued by the parties in this Court. See, *e.g.*, *Erie R. Co.* v. *Tompkins*, 304 U. S. 64, 82; *Terminiello* v. *Chicago*, 337 U. S. 1, 7; *Switchmen's Union* v. *National Mediation Board*, 320 U. S. 297, 299-300, 310-311. Resolution of the question of law

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[144] In this connection it is important to note that the mode of review of Commission orders reviewable under Section 402(a) of the Communications Act has been changed by the provisions of the Hobbs Act, Public Law 901, 81st Cong., 2d Sess., which abolishes the statutory three-judge court and the appeal as of right, and substitutes review by a court of appeals with a limited discretionary review in this Court by writ of certiorari. The provisions of this Act are now applicable to all cases arising thirty days after December 29, 1950, its date of enactment. (See Public Law 901, 81st Cong., 2d Sess.)

In view of the fact that as a result of this statute, the responsibilities of reviewing courts in their relationship to this Court under 402(a), as well as under Section 402(b) of the Communications Act, are now clearly defined in the terms set out in the discussion in *Universal Camera Co.* v. *National Labor Relations Board*, No. 40, this Term, it would appear to be unnecessary for this Court, for the purposes of judicial administration in the guidance of lower courts, to plunge into an inquiry whether the relationship of a statutory three-judge court to this Court is different from that of a court of appeals. *Cf.* Section 402(e), Communications Act of 1934, 47 U. S. C. 402(e); Labor Management Relations Act, Sec. 10(e), 29 U. S. C. (Supp. III) 160 (e).

here presented does not require extended study[145] of the admittedly lengthy administrative record in this case. It requires, we think, only reiteration of the oft-repeated admonition of this Court that the question whether an administrative record is stale, whether changed conditions caused by war or defense preparations, or scientific or economic changes and fluctuations, is a question for the administrative agency's informed discretion, and that "it is not true * * * that 'the courts must in a litigated case, be the arbiters of the paramount public interest.'" *United States* v. *Pierce Auto Lines*, 327 U. S. 515, 535. As this Court put it in *Interstate Commerce Commission* v. *Jersey City*, 322 U. S. 503, 514-515:

> One of the grounds of resistance to administrative orders throughout federal experience with the administrative process has been the claims of private litigants to be entitled to rehearings to bring the record up to date and meanwhile to stall the enforcement of the administrative order. Administrative consideration of evidence * * * always creates a gap between the time the record is closed and the time the administrative decision is promulgated. This is especially true if the issues are difficult, the evidence intricate, and the consideration of the case deliberate and careful. If upon the coming down of the order litigants might demand rehearings as a matter of law because some new circumstance has arisen, some new trend has been observed, or some new fact discovered, there would be little hope that the administrative process could ever be consummated in an order that would not be subject to reopening. It has been almost a rule of necessity that rehearings were not matters of right, but were pleas to discretion. And likewise it has been considered that the discretion to be invoked was that of the body making the order, and not that of a reviewing body.

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[145] It may be noted that in *El Dorado Oil Works* v. *United States*, 328 U. S. 12, 13, 19, this Court sustained on its merits an order of the Interstate Commerce Commission entered on a large record notwithstanding the fact that the three-judge district court below had not passed on the merits, having disposed of the case on jurisdictional grounds.

See also 322 U. S. at 522.

From what has been said, it appears that the court below did not, as appellants put it, leave unresolved the question whether "The Commission had abused its discretion and violated statutory command in refusing to consider relevant matter submitted, at the Commission's request, after the close of the testimony but before the close of the administrative record." (Br., p. 139). Nor did the court below refuse to look at the Condon Committee Report and the RCA Progress Report (see *infra*, pp. 124-135) to "see whether the Commission had acted lawfully in refusing to consider them" (Br., p. 141). After describing the Condon Report in detail (R. 872-3), the court below ruled that the Commission had not erred in not relying on it since "Congress has conferred upon the Commission and charged it with the responsibility of conducting hearings and in reaching its own independent conclusions predicated thereon." With respect to the RCA Progress Report, the court below did not say that its consideration of *it* would constitute a trial *de novo*; it simply refused to hear *witnesses* "offered for the purpose of showing current developments • • • which have been called to the attention of the Commission • • • ." (R. 874-5). This determination by the court below that it was not the forum for retrial of the issues of fact and policy which had been resolved by the Commission was clearly correct. *National Broadcasting Co.* v. *United States*, 319 U. S. 190, 227; *United States* v. *Pierce Auto Lines*, 327 U. S. 515, 535; *Interstate Commerce Commission* v. *Jersey City*, 322 U. S. 503.

It is absurd to say, as appellants do (Br., p. 138), that the court below denied the judicial review to which they were entitled by not mentioning in its opinion the appellants' variously phrased contentions on the issue of compatibility. That the court below chose properly to resolve that issue by applying the doctrine of administrative finality rather than in the terms used by appellants is not unusual in the judicial process; much less is it error.

The further contention that the court below failed to pass upon several other specific issues tendered it by the parties (Br. 139; see also appellant-intervenor Emerson's Reply to Motion to Affirm, pp. 5-9), has, in the main, already been disposed of by the foregoing discussion. For the rest, it suffices to say that the questions (1) whether the Commission should have authorized RCA color as well as CBS,[146] (2) whether the Commission's request for information as to "bracket standards" was so beyond its statutory authority as to void its order[147] and (3) whether the alleged failure of the Commission to consider relevant matter presented violated the Administrative Procedure Act,[148] being so lacking in substantiality (see *supra*, pp. 96-113; *infra*, pp. 132-133), hardly required discussion by the court below in the sense that its failure to discuss those questions must lead to a reversal and remand. It was not error summarily to reject what was unconvincingly advanced.

All the reasons which warranted the Commission in choosing "color now" over "compatibility" apply as well to demonstrate the public interest in a prompt termination of this litigation. Each month of delay means investment by the public in 900,000 television sets which would later require external adaptation involving a cost of millions of dollars a month in excess of the cost of such sets were they internally adapted at the factory, as they would most likely be once standards are effective (*infra*, pp. 140-142). With the record of the proceedings before the Commission and the court below now before it, and with the benefit of full briefs and oral argument, this Court is now in a position to determine that the court below properly upheld the Commission's order. It is not lightly to be assumed that a Federal court has not discharged its duties and has not given a case presented to it careful consideration, despite

[146] See Emerson's Reply to Motion to affirm, pp. 5, 6.

[147] See Emerson's Reply to Motion to affirm, pp. 7, 8, and appellants' brief, p. 139.

[148] See appellants' brief, p. 139.

its explicit statements that it has. In these circumstances, neither judicial administration, the requirements of justice, nor the public interest require that the case be remanded for a more artistic and extensive expression of the same correct result. Indeed, in view of the Commission's express finding that extended delay in the establishing of the color system found to be satisfactory works injury to the public (*infra*, pp. 138-140), and in view further of the fact that such delay may defeat the purpose of the administrative order itself (*infra*, p. 140) even though it may ultimately be upheld, prolongation of the proceedings in circumstances where it can and should now be terminated here would be adverse to the public interest and might even frustrate altogether the administrative action which is in issue, thus in effect determining the case without a final disposition on the merits.[149]

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[149] It may be noted in closing this point that appellants are in error in stating (Br., p. 58; see also pp. 39, 135) that this Court, in the *Universal Camera* case, No. 40, this Term, "noted that the Seventh Circuit had followed a standard of judicial review contrary to that which this Court has now held to be proper." The fact is, and this Court's opinion in the *Universal Camera* case reflects it, that the Seventh Circuit, like the Second Circuit, had simply held that the standard of review remained unchanged by the Administrative Procedure Act and the Taft-Hartley Act (*National Labor Relations Board* v. *LaSalle Steel Co.*, 178 F. 2d 829, 834 (C. A. 7)), thus indicating that that circuit had previously been applying the "record as a whole" test made explicit in the later statutes. This Court expressly refrained from disapproving the practice of those courts of appeals, "perhaps a majority" of which "have always applied the attitude reflected in this legislation." (*Universal Camera* case, slip op. p. 15).

II

THE PROCEDURES ADOPTED BY THE COMMISSION WERE REASONABLE.[150]

A. The Commission Properly Refused to Base Any Determination on *Ex Parte* Consideration of Material Outside the Record and It Properly Failed to Reopen the Record on the Basis of Such Material.

Appellants insist (Br., pp. 115-128; see also pp. 28-30) that the Commission committed fatal error in assertedly violating "its duty . . . to inform itself and to take account of determinative facts". The "violation" arises, it is urged, from the Commission's treatment of the Condon Committee Report[151] and the so-called RCA "Progress Report,"[152] an informal report by RCA on its "progress" in its development of its color television system. Appellants' contentions on this score are not wholly clear; they

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[150] In addition to the procedural issues discussed herein, intervenor-appellants Wells-Gardner & Co. (complaint, par. 26, R. 500) and Emerson Radio and Phonograph Corporation (complaint, par. 10-12, R. 539-40) alleged in their complaints that the Commission had improperly denied their petitions to intervene in the Commission's proceedings. The contention is not pressed here. These companies had filed petitions for intervention several months after the Commission's Notice had been issued, and after 4,000 pages of testimony had already been taken (Tr. 1182, 1223, 1227), despite the fact that the Notice had specifically provided for the method by which, and time within which, parties could appear and participate (Par. 15(a), R. 22-3). Further, neither petition pointed to any matters concerning which the petitioners had any new or relevant evidence which had not already been fully canvassed. The Commission denied the petition on these grounds (Tr. 1257, 1291). Its action was plainly reasonable. *Allen Co.* v. *Cash Register Co.*, 322 U. S. 137, 142.

[151] Report of the Advisory Committee on Color Television to the Senate Committee on Interstate and Foreign Commerce, S. Doc. 197, 81st Cong., 2d Sess.

[152] To the extent that appellants' allegation of error is also predicated on the Commission's denial of RCA's petition of October 4, 1950, requesting that final determination be postponed until after June 30, 1951, it is discussed below in Point II B.

appear to argue alternatively that the Commission's alleged error lay either in its failure to consider these reports *ex parte* or in its failure *sua sponte* to reopen the record for their inclusion and consideration. Whatever the contention, however, it is clear that the Commission's treatment of these reports was wholly proper.

The RCA "Progress Report" (R. 399) was informally transmitted to the Commission on July 31, 1950, more than two months after the hearing had been closed. In the letter of transmittal accompanying the Report, it was stated (R. 399) that the Report "was prepared for the information of the radio industry" and that "It is expected that additional reports of this kind will be distributed from time to time. As they are issued, copies will be sent to the Commission for the information of the members and its staff". RCA did not, either explicitly or implicitly, request that the record be reopened or that the decision be delayed for the consideration of this Report or its promised successors. On the contrary, two days later, the Chairman of the Board of RCA expressly negated any such possible inference by addressing a letter (Tr. 16220; R. 699) to the Chairman of the Commission stating that "Items have appeared in the trade press that there are those who are in favor of delaying the disposition of this matter by the Commission. On behalf of RCA and NBC we wish to reiterate that we have not and do not favor any delay in the establishment by the FCC, of commercial standards for color television."

On September 28, 1950, almost a month after the First Report had been issued, RCA again submitted the Progress Report and, for the first time, it also submitted the Condon Committee Report (R. 330), which had been issued a month and a half before. These reports were submitted as an appendix to RCA's comments (R. 289) filed in response to the Commission's Second Notice of Further Proposed Rule Making (R. 288A). That Notice, directed only to the question of bracket standards (*supra*, [redacted] 27), was

limited to proposing such standards and requesting comments thereon. The reports, thus gratuitously appended to RCA's comments, were, of course, not responsive to the Notice and indeed were wholly irrelevant to it.

Once again, these reports were unaccompanied by any clear request that the record be reopened[153] or that the decision be delayed for their consideration.

As will be shown, the Commission was clearly correct in refusing to rely *ex parte* on matters not of record in reaching its decision (cf. First Report, Paragraph 148, R. 165); it was equally correct in not reopening the record to receive these documents.[154]

1. *The Commission properly refused to base any determination on the ex parte consideration of the Progress and Condon Committee Reports.*—The RCA Progress Report, which as has been noted, was a report to the radio industry copies of which were also informally transmitted to the Commission, included a number of claims by RCA concerning alleged improvements since the close of the hearings. It claimed (1) that the tri-color tube had been developed so that it achieved brightness of "more than 20-ft. lamberts", "substantially eliminated" moire pattern and dot structure (see *supre*, p. 62) and embodied 600,000 phosphor dots instead of the original 351,000 dots, thus in-

[153] See *infra*, pp. 133-134.

[154] It is to be noted that these are the only issues and not, as appellants appear to contend, whether the Commission altogether ignored the reports. For the Commission did not ignore these reports, and was aware of their nature: It stated in its Second Report (Par. 9, R. 416): ". . . we have carefully considered all the material set forth in the comments, filed pursuant to our notice concerning bracket standards, as they are directed to the findings and conclusions in the Commission's First Report relating to the three color systems. Most of this material is merely a restatement of the parties' contentions made over and over again during the course of the hearings. These contentions have been analyzed in detail in the Report and no further discussion of them is necessary here." To the extent that additional contentions were made, the Commission discussed them in Paragraphs 10 and 11 of the Second Report (R. 417).

creasing its resolution; and that additional research work on the tube was continuing (R. 401); (2) that receiver circuits had been developed which "are simpler and more stable" and would shortly "be available for testing in the Washington area" (R. 401); (3) that "improved transmitter sampling techniques have been developed" and "work is in progress on several types of studio and field cameras", which are "in various stages of development" and would be tested when completed (R. 402); (4) that "improved equipment for 2.4 mc. sampling is being installed in Washington for further field test and refinement of color transmission over existing coaxial cable circuits" (R. 403); (5) that RCA color was being broadcast in Washington (R. 403); and (6) that "the problem of oscillator radiation should be dealt with as a matter of receiver design" and RCA "has devised improved circuits to reduce this radiation" (R. 404).

This report, even though intended for industry consumption as a statement of progress, in considerable measure was simply a reiteration of claims of improvement *in futuro* which RCA had already made at the hearings and which, the report itself stated, involved matters which were still to be tested or to be further developed.[155] The report was wholly devoid of any unequivocal claims or descriptions of actual accomplishments in respect of such basically unsatisfactory characteristics of the RCA system as poor color fidelity, misregistration (particularly at the camera),

[155] For example, the Report stated that "work is in progress on several types of studio and field cameras" including a camera using a single image orthicon. At the very outset of the hearing, RCA had similarly testified that a field camera was being developed (Tr. 2718, 2818, 6034-6), but no field camera was ever demonstrated to the Commission. Similarly, if the reference in the Progress Report to a single image orthicon meant a color camera with one tube (mosaic) which would solve misregistration difficulties, this bare statement was hardly persuasive in the absence of some explanation in respect of how a single tube camera could be used with a system using mixed highs, since such a system by its very nature requires a simultaneous camera pickup of three color signals (First Report Par. 83, R. 140; Tr. 9297, 9298-9, 11252-4) and hence, presumably requires three camera tubes or their equivalent.

criticalness of color control and excessive susceptibility to oscillator radiation interference which the Commission found, among others, to exist in the RCA system.[156]

Whatever the subject matter of the claims embodied in the Progress Report, moreover, the Commission was not bound to accept these claims—either present or *in fu-*

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[156] The only claims in the Progress Report of actual accomplishment which were not stated to require further testing or development were the achievement of receiver brightness of 20-foot lamberts and an increase in the number of dots on the tri-color tube from 351,000 to 600,000. But the Commission had explicitly found (First Report, Par. 76, R. 137) that RCA could "undoubtedly" develop receiver equipment with higher brightness than demonstrated, although there was question whether "much higher brightness" could be achieved on the tri-color tube. In any event, in its conclusions, the Commission did not assign inadequate brightness as one of the grounds for rejecting the RCA system (First Report, Pars. 132-138, R. 159-62; Second Report, Par. 3, R. 414). Further, while the Commission found (First Report, Pars. 116, 134, R. 153, 160) that, as demonstrated, the tube had an insufficient number of dots, it did not in any way indicate (as it did in respect of many other RCA deficiencies) that this inadequacy could not be remedied. It is also to be noted that the effect of an inadequate number of dots is lowered resolution, and resolution was not a factor upon which the Commission based its rejection of the RCA system (First Report, Pars. 132-138, R. 159-62; Second Report, Par. 3, R. 414). Clearly, neither of these two "accomplishments" affected the basic deficiencies which the Commission found to exist in the RCA system.

While the Progress Report claimed "substantial elimination" of dot structure, the Commission had explicitly recognized that dot structure might be minimized—although probably at the cost of other factors (First Report, Pars. 97 and 133, R. 144, 160). The Progress Report made no mention of the effect on these other factors of the alleged "substantial elimination" of dot structure.

As for oscillator radiation, it is to be noted that the Progress Report comments dealt not with the excessive *susceptibility* of the RCA color system to such interference, but to steps assertedly being taken to reduce the intensity of interfering *transmissions* by other receivers. Oscillator radiation is caused by other receivers and the Progress Report made no claims that RCA color transmissions could be made less *susceptible* to offending transmissions. RCA can hardly claim that it can control the construction of all black and white receivers, diathermy machines and other radiating instruments made by other manufacturers; yet only by such control could RCA eliminate the problem of radiation.

turo—at their face value as a basis for making findings or reconsidering its First Report. The record discloses a persistent history of prior claims by RCA which had never been fulfilled. Thus in 1946, RCA witnesses had stated that RCA had "established beyond question" the basic principles of a "simultaneous" color television system, and that standards could be set for that system within eighteen months (Docket 7896, pp. 646, 664, 1329, incorporated by reference in present hearing (Tr. 2004) and cited in separate opinion of Commissioner Jones (R. 246, 276-81)). Yet no standards were ever set for that system (Tr. 10343-4) which in fact proved to be a failure even before it emerged from the laboratory. (R. 163) Further, RCA's witnesses in this hearing testified in September 1949 that a field camera would be completed by spring (Tr. 2718, 2818); yet no field camera was ever demonstrated (Tr. 9352). Similarly, an RCA witness, on September 29, 1949, flatly claimed that RCA had "successfully achieved" its objective of a system with high performance standards (Tr. 2657); later, and after its first demonstration on October 10, 1949, the same RCA witness testified that at the time of that demonstration, RCA had not yet proceeded far enough in its development program to be able to substantiate its theories (Tr. 6131).

In the light of these circumstances, either singly or in combination, it clearly was not an abuse of discretion or otherwise illegal for the Commission to have refused to take the Progress Report into consideration as a basis for its determination. To have adopted such a course would have involved throwing *ex parte* material into hotchpot with the evidence adduced at the formal hearing. It would have substantially negated the Commission's deliberate choice of submitting all the evidence and opinions on the color television issues to the exacting crucible of open hearings, sworn testimony, the personal appearance of witnesses, and cross-examination. Whether or not *ex parte* reliance on the report ever would have been permissible as a matter of due process (and it may be noted that RCA

was quick to claim that in these very hearings due process required full right of cross-examination (Tr. 11698-11711)), in the light of the failure of RCA to have requested such consideration, in the light of the nature of the Progress Report itself and the equivocal or relatively insubstantial claims it made, and in the light of the past history of RCA's failure to match claims by performance, it is clear that the Commission was not in error in refusing to rely on the Progress Report as a basis for its decision without reopening the record.

Similarly, the Commission clearly did not abuse its discretion in refusing to rely, without reopening the record, on the Condon Committee Report as a basis for its decision. That report, while issued on July 10, 1950, was not submitted by RCA to the Commission until September 29, 1950—almost a month after the Commission had issued its First Report. As in the case of the second submission of the Progress Report, the Condon Committee Report was gratuitously appended by RCA to its comments of September 28, 1950 (R. 330) and was equally unresponsive to the Commission's Notice pursuant to which the comments purported to be filed.

The Condon Committee Report was not such as to require the Commission, at so late a date and on the eve of its Second Report, to consider it *sua sponte* and *ex parte* as a basis for new findings and conclusions. The Condon Committee Report had been prepared at the request of the Chairman of the Senate Committee on Interstate and Foreign Commerce and was intended to advise him concerning the status of color television (R. 332-5). Its consideration of that question was on a wholly different basis than that of the Commission, for, as the Condon Committee Report stated (R. 335), "no recommendation for the adoption of a specific system is given, since the committee believes that the decision to adopt a system must include consideration of many social and economic factors not properly the concern of the technical analyst." Such factors,

of course, were necessarily the concern of the Commission. Thus the Condon Committee Report was more concerned with the ultimate theoretical potentialities of the several color systems than with the economic, social and practical problems involved in achieving these potentialities.

Further, the Condon Committee Report referred to no new evidence relating to the systems before the Commission. Indeed, the Committee expressly stated that its evaluation of the systems was based on only a part of the evidence which was before the Commission—solely on the demonstrations of the systems, including the demonstrations on the record before the Commission (R. 336), and, in the case of each system, *on the testimony submitted to the Commission by the proponent of that system*[157] (R. 354, 358, 364). Thus, the more critical analyses by less partial witnesses were not considered by the Committee. And the significance of this basis of the Committee's consideration is underscored by the fact that what points of difference there were between the conclusions of the Committee and those of the Commission related primarily to the *theoretical* potentialities of the RCA system rather than to its achieved performance.[158]

In view of the different functions of the Commission and the Committee, the different fundamental approaches of each, and the fact that the latter considered the issues largely on the basis of the claims of the proponents themselves, without taking into consideration the opposing evidence which was so important, particularly in evaluating the RCA claims, it is clear that the Commission was not required to consider, *sua sponte* and without reopening the record, the Condon Committee Report as a basis for its

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[157] Thus, Paragraph 25 of the Committee Report states that the information included in the report concerning the RCA system "*is based on the testimony submitted by the Radio Corp. of America to the FCC during the color-television hearing*, and on demonstrations of the RCA system witnessed by members of the Committee prior to May 1, 1950" [italics supplied] (R. 364).

[158] For example, the Committee noted (R. 368) that "The color fidelity demonstrated in the RCA system was considered by the

decision. For, as the court below stated in respect of the Condon Committee Report, "After all, Congress has conferred upon the Commission and charged it with the responsibility of conducting hearings and in reaching its own independent conclusions predicated thereon" (R. 873).

Nor does Section 4(b) of the Administrative Procedure Act (60 Stat. 238, 5 U. S. C. 1003(b)) (Appendix A, *infra*, pp. 154-155) require a different conclusion in respect of the Commission's refusal to base its decision in whole or in part on the RCA Progress Report or the Condon Committee Report. Section 4(b) provides that where notice is required under the Act "the agency shall afford interested persons an opportunity to participate in the rule making through submission of written data, views, or arguments with or without opportunity to present the same orally in any manner; *and, after consideration of all relevant matter presented,* the agency shall incorporate in any rules adopted a concise general statement of their basis and purpose" [italics supplied.][159]

It is obvious from the text of Section 4(b) that the clause "after consideration of all relevant matter" does not require an agency which in fact has chosen to hold a formal hearing involving sworn testimony subject to cross-examination to consider not only the evidence so adduced but to consider equally *ex parte* material submitted after the close of such a hearing. The "relevant matter" which the subsection requires to be considered is that presented in *informal* rule-making proceedings limited to "written data, views, or arguments."

It would take the use of the plainest language by the Congress to justify the conclusion that the efficacy and protection afforded by formal rule-making hearings, when voluntarily held, must nevertheless be undermined by the

[159] The provisions of this subsection, however, are made inapplicable to rule-making proceedings in which hearings are required. See *supra*, pp. 43-44.

agency's consideration as a basis of its decisions of *ex parte* material submitted after the hearing is closed. The text of Section 4(b) coincides with common sense in establishing that no such bizarre result is compelled.

2. *The Commission's failure to reopen the record on the basis of the Progress and Condon Committee Reports was reasonable and proper.*—As noted above, appellants also appear to contend that if it was not error for the Commission to refuse to consider the Progress and Condon Committee Reports as a basis for its determination without reopening the record, it was error for the Commission to have failed *sua sponte* to reopen the record on the receipt of these documents in order to admit and consider them. Thus it appears that appellants argue that the Commission fatally erred in failing to do what RCA so carefully refrained from asking the Commission to do, and, indeed, in the case of the Progress Report, what the Chairman of the Board of RCA explicitly repudiated doing (see *supra*, p. 125).

Appellants contend (Br., p. 122) that in RCA's comments to which the Condon Committee and Progress Reports were appended, "RCA specifically invited the attention of the Commission to its duty to consider the facts stated" in these Reports; on this basis they claim that they asked the Commission to reopen. Appellants' contention is based on the presence, at p. 14 of their 52 page document entitled "Comments of Radio Corporation of America," of a statement that "We believe that in a rule-making proceeding of the importance of this one, it is the duty of the Commission, before making findings at odds with those of a group of scientists of the stature of the Condon Committee, to keep the record open and to inform itself as to the basis for the findings of the Committee. We believe that, in the circumstances, the Commission had the same obligation with respect to the RCA Progress Report." At no other point in the comments, including the "Conclusion" (R. 316), was there any other reference to reopening.

Plainly, this was not enough to constitute such a request for reopening as required, as a matter of procedure, or even justified, action by the Commission, especially in the light of the letter previously addressed by RCA's Chairman to the Chairman of the Commission (*supra*, p. 125). Parties cannot thus bury and equivocate their positions and then later complain that an agency was in error in failing to do what was never unambiguously asked of it.

Nor can the RCA petition of October 4, 1950 (*infra*, p. 135), properly be regarded as a request to reopen to receive the Progress Report or new evidence. As will be shown below (pp. 135-137), the petition asked merely that the Commission hold the record open until June 30, 1951, so that by *the latter time* RCA could come forward with new evidence. The petition contained no offer to show any matter at the time of the petition, and no request that at that time the Commission hear or view anything.

It would be novel indeed to conclude that in such circumstances, error was committed in failing to reopen the record. But no such novel conclusion is warranted.

For, as already noted, neither the Progress Report nor the Condon Committee Report embodied material, the nature of which was such as to require the Commission further to prolong the already extensive and exhaustive proceedings by reopening the record. In the case of the Progress Report, there were no offers of proof but only oft-reiterated claims either of present improvements in non-essential matters or improvements yet to be completed and tested. Clearly, if mere claims in so dynamic a field as television required reopening, there could never be an end to the proceedings (see *infra*, pp. 137, 139). In the case of the Condon Report, there was only the fact that a different group of individuals, with wholly different functions, with a wholly different basis of approach, and upon the basis of only part of the evidence which the Commission had before it, had come to somewhat different judgments than the Commission on some matters.

Whether an administrative agency should reopen a record for the purpose of admitting new evidence is a matter within its discretion. Only a showing of the clearest abuse of discretion warrants a finding of error. *United States* v. *Pierce Auto Freight Lines*, 327 U. S. 515; *Interstate Commerce Commission* v. *City of Jersey City*, 322 U. S. 503. Particularly in the light of the extensive hearing already had, and also in the light further of the adverse effects upon the public interest arising from additional delay which would have threatened the very heart of the Commission's determination (see *infra*, pp. 138, 140-142), the Commission's failure *sua sponte* to reopen the record to consider the Progress and Condon Committee Reports plainly does not justify judicial intervention.

B. The Commission's Denial of RCA's Petition to Postpone Decision Was a Reasonable Exercise of Its Discretion.

On October 4, 1950, one month after the issuance of the First Report, and when it had become apparent, on the basis of the comments which had been received on bracket standards, that the Commission was about to adopt color standards for the CBS system as it had announced in the First Report that it would do (*supra*, pp. 26-27), RCA filed a petition requesting the Commission to postpone a determination until after June 30, 1951 (R. 408). The petition requested the Commission

> (a) during the period December 5, 1950 to January 5, 1951, to review the improvements made in the performance of the RCA system; and
>
> (b) during the period to June 30, 1951, to view experimental broadcasts of color signals under the RCA, CBS, CTI and other systems, before making a final determination in respect of color standards.

The petition was *not* that the Commission at that time take any new evidence or attend any new demonstrations.

Rather, in essence, the petition was a request that the Commission postpone decision and some nine months later, start over again, for the petition contemplated not only the consideration of systems already considered but also "other systems". It must have contemplated, therefore, that, at the conclusion of the experimental broadcasts which were to continue until June 30, 1951, new hearings would necessarily be held (see First Report, Par. 148, R. 166, in which the Commission had expressly noted that "one of the easiest methods of defeating an incompatible system is to keep on devising new compatible systems in the hope that each new one will mean a lengthy hearing . . .").

To support this extraordinary request, RCA set forth only the barest of reasons.[160] The petition (R. 408) stated only that since the Commission "felt the most desirable course to follow was to allow more time for the development of all color systems," subject only to the adoption of bracket standards and the building of bracket standard receivers, and since such standards and receivers had proven to be "impractical," the Commission should "now allow that time."[161] The petition also announced that during the period December 5 to January 5,

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[160] The request for delay was wholly inconsistent with the testimony of the Chairman of RCA's Board of Directors. He stated in May 1950 (Tr. 10555), that whatever delay might occur thereafter in setting standards for color television could not be attributed to RCA, because RCA was ready immediately to proceed; he told the Commission "Give us the green light and we will go ahead with commercial television and take a chance on whether we can live up to the promises and proposals we have made." Again, at Tr. 10603, the same witness testified that he was opposed to delay in setting standards because the quickest progress would be made by immediate authorization of color television on a regular commercial basis.

[161] The argument is, of course, a complete inversion of the Commission's reasoning in the First Report. The Commission had stated that further postponement should *not* be permitted, and CBS standards should be *immediately* adopted, if bracket standards could not be promptly adopted. This is quite different from RCA's statement that since bracket standards could not be adopted, decision should be postponed.

> * * * we will show the Commission the improvements made in the performance of the RCA system, with particular reference to those points about which the Commission expressed doubts. Some of those improvements are set forth in the RCA Progress Report of July 31, 1950.
>
> By June 30, 1951, we will show that the laboratory apparatus which RCA has heretofore demonstrated has been brought to fruition in a commercial, fully-compatible, all-electronic, high-definition system of color television available for immediate adoption of final standards.

On October 10, 1950, simultaneously with the issuance of its Second Report, the Commission denied RCA's petition (R. 410). In its denial, the Commission reviewed the extensive proceedings which culminated in the First Report, and it noted that in that Report it had specified the terms and conditions under which it would give consideration to new proposed color systems and under which it might consider reopening the record.[162] It further stated (R. 411) that RCA—

> * * * has had a full and fair opportunity to present its proposals to the Commission; that the state of the television art is such that new ideas and new inventions are matters of weekly, even daily occurrence; that the question of approving a color television system which will best serve the interests of the American people is one which has been before the Commission for almost 10 years; that in all proceedings such as the instant one a point is reached which calls for administrative finality with respect to the Commission's hearing proc-

[162] In its First Report, the Commission had stated (Par. 154, R. 169), that if bracket standards could be adopted, and bracket standard receivers could be built promptly, it would consider new or improved color systems if the proponent of such a system delivered receiving equipment to the Commission laboratory by December 5, 1950, and if the proponent conducted a series of demonstrations which would show "to the Commission's satisfaction that, in its judgment, the system had a reasonable prospect of satisfying all the criteria for a color television system set forth in Paragraph 122" (see *supra*, p. 14, note 18).

> esses; and that in the sound discretion of the Commission a delay in reaching a determination with respect to the adoption of standards for a color television service as requested in the instant petition would not be conducive to the orderly and expeditious dispatch of the Commission's business and would not best serve the ends of justice; * * *

Further, as the Commission noted in its Second Report (Par. 15, R. 419-20):

> * * * a new television system is not entitled to a hearing or a reopening of a hearing simply on the basis of a paper presentation. In the radio field many theoretical systems exist and can be described on paper but it is a long step from this process to successful operation. There can be no assurance that a system is going to work until the apparatus has been built and has been tested. None of the new systems or improvements in systems meet these tests so as to warrant reopening of the hearing.

Thus, as the Second Report and the order denying the petition so clearly establish, the refusal to postpone the Commission's determination was wholly reasonable and not such an abuse of discretion as, under settled principles (see *supra*, p. 120) would permit reversal.

For, after 10,000 pages of testimony, 265 exhibits, hearings covering nine months, eight demonstrations, a thorough canvassing of all views, and a painstaking and comprehensive report analyzing the several systems, the Commission had before it RCA's bare assertion, unsupported by any facts or any concrete claims of new improvement, that if the Commission would wait another nine months, RCA would be able to demonstrate a system which it had announced, in terms almost identical to those used in the petition for delay, as "successfully achieved" at the opening of the hearings in September 1949—over a year earlier (Tr. 2657; see also Exhibits 206 and 209).

Thus RCA was claiming on October 4, 1950, that it could, by June 30, 1951, reach a stage of development which, long

before, it had already claimed it had reached.[163] And, in any event, in judging RCA's claims in its petition, the Commission had before it RCA's history, already noted (*supra*, pp. 128-129), of unfulfilled claims and promises.

To have postponed determination on a basis such as that presented by RCA would have threatened perpetual indecision for, as the Commission noted, the radio field is dynamic, there are constant developments,[164] and there must be a stopping point somewhere if standards are ever to be set.[165] And where that stopping point is reached is a determination within the particular province of the Commission.

The reasonableness of the Commission's determination that the stopping point had been reached, and that the RCA petition did not justify moving it further along the calendar of years, is particularly confirmed by the adverse effects of delay, which the Commission had previously noted in detail. In its First Report, issued prior to RCA's petition, the Commission had stated (Par. 148, R. 166) that it could not

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[163] Exhibit 209, submitted by RCA on September 27, 1949, was a description of the RCA system, and was entitled "A Six-Megacycle Compatible High-Definition Color Television System." In Exhibit 206 (Sept. 27, 1949), RCA had stated that its new system was "created" and "developed." Long before October 4, 1950, RCA witnesses had also testified that the system was available for immediate adoption of final standards (see Tr. 6125, 6148, 10079, 10555, 10721-8, 10731, 10875; see also Tr. 2781).

[164] That constant new developments and claims follow on each other's heels so rapidly is confirmed by appellants themselves (Br., p. 16), who point out that in the period of four and one-half months between May 26, 1950, and October 10, 1950, no less than three new or improved systems had been claimed as in progress.

[165] It is significant that this view is supported by a wholly independent electronics expert who testified at the hearing. Dr. Charles W. Geer, Professor of Physics at the University of Southern California, testified (Tr. 3937), "I believe we have to decide to go ahead if we are going to go ahead, and if we decide to wait, when we come to the place where three roads open ahead of us—*if we wait and stay at the place where those three roads branch out until we know all the facts about everything along each of the three roads, we will never get the car started*" (italics supplied).

> overlook the obvious fact that one of the easiest methods of defeating an incompatible system is to keep on devising new compatible systems in the hope that each new one will mean a lengthy hearing so that eventually the mere passage of time overpowers the incompatible system by the sheer weight of receivers in the hands of the public.

So, too, in its Second Report, the Commission stated (Par. 15, R. 420) that to reopen the record on the basis of mere claims of improved compatible systems

> would be inviting the risk that these new systems might fail as have all color systems in the past which we have been urged to adopt on the ground of compatibility and the increase in the number of receivers in the hands of the public would make it exceedingly difficult to adopt an incompatible system—a system which we know is satisfactory.

Thus, at the worst, the lengthy postponement requested by RCA might have meant depriving the public of color television altogether. For, as the Commission had found, the defects in the RCA system were inherent and it was exceedingly doubtful that they could be remedied (*supra*, pp. 14-15). It had also found that it was unlikely, on the basis of experience, that a satisfactory compatible system could ever be devised (First Report, Par. 123, R. 156). If, therefore, as the record and the Commission's past experience so strongly indicated, a satisfactory compatible system were not achieved during the period of postponement, and if, further, during the interim, the number of black and white receivers in the hands of the public had increased to so great a number that it would be impracticable to adopt such a system, color television would be lost to the public for an indefinite time.

At the best, on the other hand, postponement as requested by RCA would have meant an enormous added obstacle to the transition to color television and a huge economic bur-

den to the public. At the time of the Commission's First Report on September 1, 1950, there were 7,000,000 black and white receivers in the hands of the public (First Report, Par. 124, R. 156). The appellants themselves establish the rapid accentuation of the compatibility problem despite the Korean War. Thus they estimate that there were more than 8,000,000 such sets in the hands of the public as of October 1, 1950 (Complaint, Par. 18, R. 4), that there were 9,000,000 such sets in the hands of the public, as of November 20, 1950, and that there were 12,000,000 such sets as of March 1951 (Br., p. 8). According to appellants themselves, therefore, the problem of incompatibility had, since the Commission's First Report and during this litigation, increased at the rate of about 900,000 sets a month. At that rate, the number of black and white sets would have increased by 8,100,000 between October 4, 1950, the date of RCA's petition, and June 30, 1951, the *minimum* date of postponement requested by it.

Since the Commission found that the lowest estimates of the cost of *externally* adapting existing black and white sets so as to enable them to receive CBS color in black and white was $32 to $50 (First Report, Par. 105, R. 147), and since according to RCA's own testimony, if new black and white sets were adapted *internally* at the time of manufacture the cost would only be $7 to $10 (Tr. 10091; Ex. 408, pp. 29-30, Tr. 9617), the huge cost to the public which would have been involved in postponement until some indefinite date beyond June 30, 1951, can be roughly estimated by comparing the difference in total cost of internal adaptation, which may be assumed once standards are in effect, and external adaptation, which would be required for sets sold before standards are established. This cost involved in postponement *only until June 30, 1951*, and without taking into account the protracted period involved after June 30, 1951, in further hearings, administrative determination, and the termination of the inevitable consequent litigation,

would be a minimum of approximately $178,200,000 and a maximum of $348,360,000.[166]

In the face of these facts—the possible loss to the public of color television for an indefinite period at the most, and the possible cost of additional tens of millions of dollars at the least—a petition for postponement would be required to set forth exceedingly persuasive facts indeed. RCA's petition made no such showing whatever.

In the light of all the circumstances, accordingly, it is plain that the Commission's denial of RCA's petition was on the basis of full consideration of all the relevant factors and was a wholly reasonable exercise of its discretion and entirely consonant with, if not in fact required by, the public interest.[167]

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[166] The total cost of *externally* adapting 8,100,000 sets (i. e., the number of sets sold between October 1950 and June 30, 1951, if sold at the present rate of 900,000 a month) at $32 to $50 each is $259,200,000 to $405,000,000. The total cost of *internally* adapting 8,100,000 sets at $7 to $10 is $56,700,000 to $81,000,000. The two figures in the text represent (1) the difference between RCA's highest estimated cost of internally adapting sets and the lowest estimated cost of externally adapting existing sets; and (2) the difference between RCA's lowest estimated cost of internally adapting sets and the highest estimated cost of externally adapting existing receivers.

As noted in the text, the total cost figures assume, as the Commission did (First Report, Par. 124, note, R. 157), that once the color standards become effective, manufacturers will then produce internally adapted sets so that the public will be able to receive all broadcasts, whether black and white transmissions under the present standards or color transmissions under the new standards. To the extent that manufacturers do not internally adapt sets (as RCA has stated it would refuse to do—Tr. 10048-9, 10419-20, 10428) and the public nevertheless purchases such sets even though they cannot receive all authorized broadcasts, the figures in the text must be reduced.

[167] The factors which led the Commission to decide against further delay in the adoption of standards based on the field sequential color system bear equally on the question of delay in their becoming effective by virtue of restraining action taken by the court below. These arguments were presented to the court below by appellees in opposing the issuance of a preliminary injunction. After its decision, the court below did, however, without being so requested by any of the parties or intervenors, stay the effective-

C. The Participation in the Proceedings of Chapin, a Commission Staff Engineer, was Proper and Did Not Vitiate the Commission's Order.

Appellants assert (Br., pp. 24-27, 142-145) that the Commission's proceedings culminating in the order here in issue were vitiated, and hence the order rendered invalid, because Edward W. Chapin, the Chief of the Commission's Laboratory Division,[168] continued to participate in the hearings although he had invented a device usable with the CBS system. The contention is without substance either in fact or in law.

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ness of the Commission's order until April 1, 1951, or until terminated by this Court. In the interests of securing a speedy determination of the entire matter by this Court, appellees have not challenged this order. It is clear, however, that the harm caused to the public by delay in the adoption of standards is as real now as at the time of the Commission's decision. Further, it should be noted that the decision of the court below is based, at least in part, on its notions concerning the existing economic situation—a matter which was not, and could not properly be, a matter for the court's consideration in this context. The question of the allocation of critical materials to promote the national defense had been specifically delegated to the President by Congress (Defense Production Act of 1950, Pub. Law 774, 81st Cong., 2nd Sess.) and by him to the National Production Authority. (See Commerce Department Order No. 123, 15 F. R. 6182, Sept. 11, 1950). The National Production Authority has not issued any orders establishing priority of use *among* civilian uses of any critical materials which may be available for the production of any kind of television receiver after defense needs have been satisfied. And, as noted in the text, appellants' own pleadings, affidavits and briefs establish that the problem of incompatibility is continuing to be aggravated at the rate of 900,000 receivers a month.

[168] Section 0.30 of the Commission's Statement of Organization (formerly Sec. 1.37 of the Commission's Rules, 47 C. F. R. (1946 Supp.) Sec. 1.37), issued pursuant to Section 3(a)(1) of the Administrative Procedure Act, describes the functions of the Commission's Laboratory Division. In general, the functions are: to develop, investigate and complete field studies, surveys and tests, resulting in the accumulation of engineering data in the field of communications; to design and assemble apparatus for special tests and studies; and to determine capabilities of new equipment.

The device involved is an automatic scanning adapter invented by Mr. Chapin and Willmar K. Roberts, his assistant, in the course of their assigned duties in connection with color television at the Commission's laboratory.[169] As initially presented by CBS, the CBS receivers required manual switching—the manual pressing of a button—in order to adjust the set when the signal to be received changed from CBS color signals to standard black and white signals, or vice versa (Tr. 3219-20). The Chapin-Roberts invention is designed to permit a television receiver, including a CBS receiver, to choose and adjust automatically between different sets of transmission standards, thus obviating any manual operation in order to accomplish the switching.

According to the testimony of RCA's own witness, Dr. George H. Brown, the device was not usable exclusively with the CBS system. Although he later filed an affidavit, dated November 13, 1950, in the court below repudiating his testimony as "facetious" (R. 765), in the hearings before the Commission and after the disclosure of the Chapin-Roberts invention, Dr. Brown testified that RCA was using a "Chapin converter" in RCA receivers in order to eliminate the dot sampling in such receivers when the transmitted signal switched from RCA color to standard black and white (Tr. 7598, 7599).

On November 22, 1949, during the hearings on the color television issues, the facts concerning the invention were completely disclosed on the record (Tr. 5980-5987), the invention itself was demonstrated, and the Commission offered in evidence a diagram of the automatic scanning

[169] On October 18, 1949, the Chairman of the Commission made a request on the record that the proponents of the systems deliver receivers to the Commission's laboratory by October 27, 1949 (Tr. 4184-6). The purpose was to permit the Commission to test these receivers (Tr. 4777). CBS agreed to deliver receivers by the date specified, and did so (Tr. 4773-4). RCA, although it had previously conducted demonstrations, replied that it could not deliver receivers until January 15, 1950 (Tr. 4774-6, 5982). RCA did not deliver a receiver until January 30, 1950 (Tr. 6108).

adapter and an itemized parts list therefor (Exhibit 296). Just prior to the demonstration on the record of the device, and after its disclosure, RCA objected. The objection, only part of which has been quoted by appellants (Br., p. 25) and which is set out in full in the margin,[170] was not to Mr.

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[170] *Mr. McDaniel* [counsel for RCA]: Mr. Chairman, I understand that this development of Mr. Chapin's constitutes what might be considered an improvement in the particular system being proposed by CBS in these proceedings.

The Commission in this case is in a judicial capacity, I assume, because it may have to choose between contesting proponents here, and when the Commission comes forward with a development which seems to be an improvement in the system proposed by one of the litigants, it sounds a little bit like a person in a judicial capacity assisting one of the parties in the contest.

I just want to make that statement and say that we take exception to putting this development into these proceedings, because we think it is inconsistent with the judicial position which the Commission should take in the proceedings.

Mr. Salant [counsel for CBS]: Would you like a statement from me?

The Chairman: I think not, unless you feel called upon. I think I can take care of it myself.

Mr. Chapin, who is putting this in, and another employee of our Commission, have developed this and have filed for patents on the development. Mr. Chapin is the head of our laboratory, he is not a member of the Commission, and in no way in position to determine the vote of a single member of the Commission; nor is any other member of the staff of the Commission. The Commission is perfectly competent and has the ability to determine between contesting forces in these hearings, whether it is RCA, CBS, DuMont, CTI, or anyone else; and I want to say on the record that I resent the suggestion very much that the Commission is influenced in its determination by the work of a single member of its staff or all of its staff when it comes to making a decision on the record in these proceedings.

If there is anything else to be said on this, let's get it off our chest now.

Mr. McDaniel: Mr. Chairman, I have said all I think I need to say. There has been no development here by the Commission's engineering staff that I know of with reference to any other system. There are two other contestants in the case proposing color systems, and it is a matter of appearance more than anything else. We just think it is a little bit out of order.

The Chairman: Mr. McDaniel, you will recall that we have asked RCA for its equipment, so that we might have an opportunity to work on it. I suspect that some of our people have capa-

Chapin's continued participation in the proceeding, but was directed solely to "putting the development into these proceedings." RCA's counsel characterized his own objection as "a matter of appearance more than anything else" (Tr. 5982). The objection was overruled.

The foregoing circumstances establish that no error was committed by the Commission in permitting Chapin to participate in the proceedings. The appellants do not claim that Chapin's participation in the proceedings and the advice he gave the Commission in the course of his duties establish actual bias on the part of the Commission.[171] They

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bilities of effecting some improvement in that system and that we may, when and if we get hold of that equipment, file a patent on an improvement on that equipment for the benefit of the Government of the United States.

You will recall privately I have had something to say to you about equipment and have had some argument with you about whether it is proper for us to have the equipment. We have not yet received the equipment. When we receive the equipment, we will have the same opportunity to work on the equipment as we have on CBS equipment.

Mr. McDaniel: We will welcome that. We have a new system and not an old system, and as soon as we can get the equipment to you, we will.

The Chairman: Is there anybody else who has questions? I am perfectly willing to answer questions on this as Chairman of the Commission, and I do not feel any one of us considers it improper for us to have taken such action, and I want to add further, if you do not know it, that I have already signed the letters to patent the equipment that you are going to see. (Tr. 5980-5983)

[171] Appellants seek to emphasize the importance of Chapin's asserted advice to the Commission by stating that five of the Commissioners are laymen, and one of the two remaining Commissioners, who is an engineer, dissented. Of course, other FCC staff engineers also participated in the proceedings and, in any event, as already noted, the Commission's findings on all matters (except in respect of whether the public would be satisfied with 12½ inch color pictures) were unanimous—concurred in by both Commissioners who were engineers. Further, it is to be noted that in respect of Commissioner Jones (who was one of the laymen who not only concurred with the majority but was of the opinion that the Commission should have adopted CBS standards immediately at the time of the First Report), General Sarnoff, Chairman of the

are concerned, they say, not with the fact of bias but with the "danger of wrong" (Reply to Motion to Affirm, p. 33), or as appellants put it before the Commission, "a matter of appearance more than anything else." And it is that plainly intangible and speculative factor which, they say, should now operate alone to destroy the product of nine months of hearings at which no objection to Chapin's participation was made.

It is conceded that Chapin had no financial interest in the automatic scanning adapter (Br., p. 142);[172] the only charge appellants make in this respect is that somehow he "had an interest of professional prestige and reputation in the adoption of the CBS system" (Br., p 142).[173] But since,

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Board of appellant RCA, stated in the course of the hearing (Tr. 10581-2):

> Well, I want to take this opportunity—I know you are not inviting it, and I am not lecturing you—but if you will permit me, I would like to say that having read the record of these proceedings, over 10 000 pages, I have been perfectly amazed at your grasp of the subject and I think you have made a contribution to the subject and to the development of the questions that have been before you. In fact, I did not expect any lawyer to know that much, technically.
>
> (Laughter)
>
> Commissioner Jones: General, my hat is off to you. You disarm me."

[172] On November 9, 1949, Chapin executed an assignment of his patent rights to the Government (R. 445).

[173] Appellants seek to show an indication of a "predisposition in favor of the CBS system" on the part of Chapin (Br., pp. 26, 143-144) by reference to Chapin's testimony concerning a comparison of the complexity and cost of RCA and CBS receivers. But not only did RCA take full advantage of its opportunity to cross-examine Chapin on this issue in an attempt to establish the asserted-ly erroneous basis of the comparison (Tr. 10626-36), but also the record shows that, quite properly, Chapin's comparison dealt, as it necessarily must have, not with recently developed RCA receivers which he had seen only momentarily at the time he had prepared his analysis, but with the receivers which RCA had initially submitted to the FCC laboratory for testing (Tr. 10627, 10629). As stated by the Chairman (Tr. 10634): "I should like to make the

as has been shown, the adapter could be used not only with the CBS but also the RCA system, that assertion must fail. In any event, Chapin's "professional prestige and reputation" could hardly be thought to be any more dependent on adoption of the CBS system than that of a judge who must retry a case after he has once been reversed and a new trial ordered. See *United States* v. *Morgan*, 313 U. S. 409, 421.

There being no showing of actual bias on Chapin's part, let alone the Commission's, appellants' belated objection to his participation must fail. For this Court has held that in circumstances such as these, nothing short of such showing will void an administrative order. Thus even the fact that the industry being regulated paid the salaries and expenses of agents of the regulatory agency has been held not to vitiate the agency's orders. *Champlin Rfg. Co.* v. *Commission*, 286 U. S. 210, 236. And the fact that an executive officer "not merely held, but expressed, strong views on matters believed by him to have been in issue" before him for decision "did not unfit him for exercising his duty in subsequent proceedings." *United States* v. *Morgan*, 313 U. S. 409, 421. Instead of permitting appellants' alleged vague apprehensions to upset the Commission's order and thus frustrate the statutory purpose in effectuation of which the order was issued, the assumption should be that announced by this Court: that commis-

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point for the record here that Mr. Chapin's testimony was based upon the receivers which were available to the laboratory for test work and observation work there. I do not want to have to review at this time, but I may, if necessary, the difficulties we have had in getting receivers from RCA for work at the laboratory" (see *supra*, note 170, p. 145).

Appellants are also mistaken in their assertion (Br., p. 142) that Chapin "supported an incompatible system." Appellants' supporting reference for their assertion is simply to a prior assertion to the same effect made by them in the court below. The fact is, as the administrative record shows, Chapin made no recommendations in the course of his testimony, but simply testified to various facts and opinions without supporting or opposing the adoption of standards for any system.

sioners chosen by the President and confirmed by the Senate "are assumed to be men of conscience and intellectual discipline, capable of judging a particular controversy fairly on the basis of its circumstances. Nothing in this record disturbs such an assumption." *Ibid.*[174]

III.

THE DISTRICT COURT PROPERLY QUASHED THE SUBPOENAS DUCES TECUM ISSUED AT THE REQUEST OF PILOT RADIO CORPORATION.

Upon the motion of appellees, the District Court quashed two subpoenas *duces tecum* (R. 873-4 which had been issued at the request of appellant-intervenor Pilot Radio Corporation (hereinafter referred to as "Pilot") on

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[174] In addition to the procedural issues raised by appellants and discussed herein, appellant-intervenor Local 1031, in its brief, also appears to suggest that the Commission's Notice instituting the color proceeding (R. 16; see *supra*, p. 5) varied so substantially from the ultimate order that the latter is thereby invalid. The contention is wholly without foundation. Section 15(a) of the Commission's Notice (R. 22-23) invited proposals for changes in engineering standards looking toward the adoption of a color system; Appendix A, Paragraph IIC of the Notice (R. 26) specified the conditions which any color system must meet. These conditions were that the system operate in a 6 mc. channel, and that "existing television receivers designed to receive television programs transmitted in accordance with present transmission standards will be able to receive television programs in accordance with the proposed new standards simply be making relatively minor modifications in such existing receivers." Pursuant to this Notice, and before the hearing, CBS, among others, filed its proposals, setting forth in full the details of its system.

Local 1031 apparently contends that the CBS system adopted by the Commission does not meet the requirement of the Notice since more than "relatively minor modifications" are required to adapt and convert existing sets. Its argument is based on purported facts which are wholly outside the record. The Commission itself explicitly found, on evidence in the record, that the CBS system is adaptable and convertible within the meaning of the Notice (First Report, Pars. 105, 106; Second Report, Par. 10; see *supra*, pp. 19-20). Hence it is clear that there is no variance between the Notice and the Order.

November 8, 1950, directing the Commission and CBS, respectively, to produce at the hearing copies of all written communications relating to color television between them and United States Senator Edwin C. Johnson, Chairman, Senate Interstate and Foreign Commerce Committee. The material sought, most of which consisted of an exchange of correspondence between Senator Johnson and the Commission, or members thereof, and between Senator Johnson and officials of CBS, was lodged with the District Court (R. 873). Pilot purported to introduce this material, together with an exchange of telegrams between Senator Johnson and Pilot, in order to show that the Commission's decision was the result of improper pressure exerted by Senator Johnson.

The action of the court below in quashing these subpoenas was clearly correct.

The material sought by Pilot was totally irrelevant to the proceedings below. There is no allegation in either Pilot's complaint (R. 451) or its motion to intervene as plaintiff (R. 450) which raised an issue upon which the requested material had any bearing whatever. As the court below stated in its opinion (R. 874), ". . . neither Pilot nor any other intervenor nor plaintiffs make any charge or allegation in their pleadings that the Commission in making its order was influenced, cajoled or coerced by Senator Johnson or anybody else." The request for these subpoenas was therefore a bald attempt to swerve the proceedings below from their orderly course by the injection of clearly irrelevant charges.

Even if the issue had been raised by the pleadings, the quashing of the subpoenas would have been proper. For it is well settled that in the absence of a substantial showing of improper conduct which would vitiate the proceedings, the court will not go behind the record to probe into the mental processes by which an administrative determination is made. *United States* v. *Morgan*, 313 U. S. 409, 421-2; *Chicago B. & Q. Ry. Co.* v. *Babcock*, 204 U. S. 585,

593. *Cf. Berkshire Employees Association* v. *National Labor Relations Board,* 121 F. 2d 235 (C. A. 3).

It is clear, in any event, that the material sought to be introduced by Pilot wholly fails to reveal any improper actions by Senator Johnson which would vitiate the Commission's proceedings. The charges made by Pilot constituted an irresponsible and unsupported reflection on the integrity of both Senator Johnson and the members of the Federal Communications Commission. As the correspondence shows, Senator Johnson, as Chairman of the Senate Committee on Interstate and Foreign Commerce, displayed an affirmative interest, entirely consonant with his official position, in the Commission's progress with respect to color television. The attack upon Senator Johnson's concern with the Commission's functions, which, as the material establishes, was in no way directed toward influencing the course of decision, was indeed an attack upon the legitimate functions of Congressional committees in their relationship to administrative agencies which the Congress has established to administer the laws which it has enacted.

The circumstances, accordingly, establish that the court below was clearly correct in quashing the subpoenas sought by Pilot.

CONCLUSION.

For the foregoing reasons, the judgment of the court below should be affirmed.

Respectfully submitted,

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March 1951.

APPENDIX A.

Communications Act of 1934, 48 Stat. 1064, as amended, 47 U. S. C. 151, *et seq.*

Sec. 4(i). The Commission may perform any and all acts, make such rules and regulations, and issue such orders, not inconsistent with this Act, as may be necessary in the execution of its functions.

Sec. 301. It is the purpose of this Act, among other things, to maintain the control of the United States over all the channels of interstate and foreign radio transmission; and to provide for the use of such channels, but not the ownership thereof, by persons for limited periods of time, under licenses granted by Federal authority, and no such license shall be construed to create any right, beyond the terms, conditions, and periods of the license. No person shall use or operate any apparatus for the transmission of energy or communications or signals by radio (a) from one place in any Territory or possession of the United States or in the District of Columbia to another place in the same Territory, possession, or District; or (b) from any State, Territory, or possession of the United States, or from the District of Columbia to any other State, Territory, or possession of the United States; or (c) from any place in any State, Territory, or possession of the United States, or in the District of Columbia, to any place in any foreign country or to any vessel; or (d) within any State when the effects of such use extend beyond the borders of said State, or when interference is caused by such use or operation with the transmission of such energy, communications, or signals from within said State to any place beyond its borders, or from any place beyond its borders to any place within said State, or with the transmission or reception of such energy, communications, or signals from and/or to places beyond the borders of said State; or (e) upon any vessel or aircraft of the United States; or (f) upon any other mobile stations within the jurisdiction of the United States, except under and in accordance with this Act and with a license in that behalf granted under the provisions of this Act.

Sec. 303. Except as otherwise provided in this Act, the Commission from time to time, as public convenience, interest, or necessity requires, shall—

* * * * *

(b) Prescribe the nature of the service to be rendered by each class of licensed stations and each station within any class;

(c) Assign bands of frequencies to the various classes of stations, and assign frequencies for each individual station and determine the power which each station shall use and the time during which it may operate;

* * * * * *

(e) Regulate the kind of apparatus to be used with respect to its external effects and the purity and sharpness of the emissions from each station and from the apparatus therein;

(f) Make such regulations not inconsistent with law as it may deem necessary to prevent interference between stations and to carry out the provisions of this Act: *Provided, however,* That changes in the frequencies, authorized power, or in the times of operation of any station, shall not be made without the consent of the station licensee unless, after a public hearing, the Commission shall determine that such changes will promote public convenience or interest or will serve public necessity, or the provisions of this Act will be more fully complied with;

(g) Study new uses for radio, provide for experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest;

* * * * * *

(r) Make such rules and regulations and prescribe such restrictions and conditions, not inconsistent with law, as may be necessary to carry out the provisions of this Act, or any international radio or wire communications treaty or convention, or regulations annexed thereto, including any treaty or convention insofar as it relates to the use of radio, to which the United States is or may hereafter become a party.

Administrative Procedure Act, 60 Stat. 237, 5 U. S. C. 1001, *et seq.*

RULE MAKING.

* * * * * *

Sec. 4(b) Procedures.—After notice required by this section, the agency shall afford interested persons an oppor-

tunity to participate in the rule making through submission of written data, views, or arguments with or without opportunity to present the same orally in any manner; and, after consideration of all relevant matter presented, the agency shall incorporate in any rules adopted a concise general statement of their basis and purpose. Where rules are required by statute to be made on the record after opportunity for an agency hearing, the requirements of sections 7 and 8 shall apply in place of the provisions of this subsection.

* * * * * *

JUDICIAL REVIEW.

Sec. 10. Except so far as (1) statutes preclude judicial review or (2) agency action is by law committed to agency discretion—

* * * * * *

(e) Scope of review.—So far as necessary to decision and where presented the reviewing court shall decide all relevant questions of law, interpret constitutional and statutory provisions, and determine the meaning or applicability of the terms of any agency action. It shall (A) compel agency action unlawfully withheld or unreasonably delayed; and (B) hold unlawful and set aside agency action, findings, and conclusions found to be (1) arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law; (2) contrary to constitutional right, power, privilege, or immunity; (3) in excess of statutory jurisdiction, authority, or limitations, or short of statutory right; (4) without observance of procedure required by law; (5) unsupported by substantial evidence in any case subject to the requirements of sections 7 and 8 or otherwise reviewed on the record of an agency hearing provided by statute; or (6) unwarranted by the facts to the extent that the facts are subject to trial de novo by the reviewing court. In making the foregoing determinations the court shall review the whole record or such portions thereof as may be cited by any party, and due account shall be taken of the rule of prejudicial error.

APPENDIX B.

Tabular Comparison of CBS and RCA Systems as Found by the Commission.

(Paragraph numbers refer to First Report)

I. Characteristics.

Subject	*CBS*	*RCA*
Color fidelity	Most satisfactory—entirely suitable for home viewing purposes (par. 140) Uniformly high quality (par. 86)	Not satisfactory—no reasonable prospect that defects can be overcome, because of misregistration, mixed highs, cross-talk between picture elements and criticalness of color control implicit where a time error of 1/11 millionth of a second results in color contamination (par. 132)
Texture	Most satisfactory (par. 140)	Not satisfactory—misregistration—"soft" quality—poorness of contrast all of which seem difficult to eliminate (par. 133)
Studio camera	Simple to handle, not expensive, able to operate in widely diversified circumstances (par. 141)	Exceedingly complex, very difficult to maintain in precise operating condition, necessary for staff of trained personnel to handle (par. 135)
Field camera	Successful demonstrations (par. 140)	None built, none demonstrated (par. 135)
Transmission of color on network	Can transmit color on 2.7 mc. coaxial cable (par. 114)	No adequate assurance that color pictures can be transmitted on 2.7 mc. coaxial cable, par. 137)

Subject	*CBS*	*RCA*
Color transmission systems	Relatively simple, relatively slow switching rate of 144 times per second (par. 112)	Complex—switching rate of 11,000,000 per second. Much more susceptible to oscillator radiation interference than black-and-white or CBS system (par. 134)
TV color home receiver	Relatively simple, color control quite simple and not at all critical; cheap enough to be available to the great mass of the American purchasing public (par. 112)	No demonstrations on the record of a practical RCA home receiver. Too bulky, complex and expensive to be seriously considered for home use. Controls so critical that even trained technicians unable to maintain color fidelity through one single demonstration (par. 134 and par. 115)
Picture-size limit	Direct view 12½ inches maximum, 16 inches with magnification. If tri-color tube is perfected, size will be unlimited	None stated (par. 144)
Tri-color tube, if perfected	Witnesses agree that it will work on CBS system, and will eliminate color wheel; quality of picture will be determined by quality of tri-color tube (par. 144)	Will work, but will not eliminate registration, fidelity or other problems, which are possibly inherent in the complex RCA system (pars. 116 and 134)

II. Effect of Color Transmissions on Present Black-and-White TV Sets.

Subject	*CBS*	*RCA*
To get black-and-white on existing set from color transmission	Need adapter (par. 105)	Can receive black-and-white without adapter (par. 107)
Quality of black-and-white reception	Some loss of resolution, but still an acceptable picture (par. 143)	Picture somewhat inferior to present black-and-white (par. 107)
To get color on existing sets	Need adapter (built in or added) plus converter (color wheel) (par. 105)	Need converter (no converter built or demonstrated) (par. 107)

III. Cost to TV Set Owner.

Subject	*CBS*	*RCA*
Adapter (internal)	"Substantially lower" than external adapter (par. 105)	None (par. 107)
External adapter	$32-$50 plus installation (par. 105)	None (par. 107)
Converter	$95-$170 (par. 106)	Unknown—none ever built and no costs estimated (par. 107)
Tri-color tube receiver, if perfected	See RCA column	RCA testified that tube twice cost of black-and-white tube (par. 134). No assurance that tube will not be unduly expensive par. 134)
Color receiver (not using tri-color tube)	$200-$360. Should be within the economic reach of the great mass of the purchasing public (par. 141)	$550 to $1,000. So expensive that it is inconceivable the public would purchase in quantity (par 134)

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IN THE

Supreme Court of the United States

OCTOBER TERM, 1950

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., RCA VICTOR DISTRIBUTING CORPORATION, ET AL., *Appellants*,

v.

THE UNITED STATES OF AMERICA, FEDERAL COMMUNICATIONS COMMISSION, AND COLUMBIA BROADCASTING SYSTEM, INC.

Appeal From the District Court of the United States for the Northern District of Illinois, Eastern Division.

SUPPLEMENTAL BRIEF FOR THE UNITED STATES, FEDERAL COMMUNICATIONS COMMISSION, AND COLUMBIA BROADCASTING SYSTEM, INC. IN RESPONSE TO BRIEF FOR APPELLANT-INTERVENOR, EMERSON RADIO AND PHONOGRAPH CORPORATION.

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Intervenor-appellant Emerson Radio and Phonograph Corporation (herein called "Emerson") contends (Br., pp. 10-12) that this is not a proper case for summary judgment

[1] A stipulation, on file with this Court, between the United States, the Federal Communications Commission and the Columbia Broadcasting System on the one hand, and RCA, NBC, and the Distributing Corporation on the other, fixed the time for exchanging briefs.

The appellant-intervenors were not parties to this stipulation and their briefs were made available to appellees at a later time than the RCA, NBC, and the Distributing Corporation brief. Hence, this supplemental brief is in response to one of the points raised in the Emerson brief.

and that, therefore, the court below erred in refusing to hear additional evidence. The contention appears to rest on the argument that one of the issues before the court was whether asserted improvements in the RCA system, occurring "during and after" the close of the administrative hearings, were of such a nature that the Commission abused its discretion in refusing to consider matters "showing the tremendous improvements made in the RCA system . . ." (Br., p. 11). The question whether the Commission thus abused its discretion, Emerson contends, can be decided only by the court's hearing evidence concerning such alleged improvements in order to determine whether they are "of trifling significance" on the one hand, or "substantial or revolutionary" on the other (Br., p. 11). Emerson urges that in holding that it could not properly hear evidence "for the purpose of showing current developments" (R, 875), the court below was in error.

Emerson's brief on this point may be read either as contending (1) that the court should have heard evidence which was directed to the issue of the nature and extent of RCA "improvements" as disclosed in the RCA Progress Report of July 30, 1950 (our main brief, pp. 126-130), or (2) that the court should have heard evidence designed to show the nature and extent of alleged improvement in the RCA system not covered by, and occurring after the transmittal of, the Progress Report.[2] But under either hypothesis, Emerson's contention is mistaken since the court below was precluded from hearing such evidence.

It is clear that the question whether the administrative agency has abused its discretion in denying a rehearing or in failing to keep its record open is a question of law.

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[2] It should be noted that in any event no offer of such evidence was presented in such a manner as to raise the issue at all. In the court below, appellants only suggested that on later hearing of a petition for a permanent injunction, they *might* want to introduce testimony of witnesses to establish the improvements in the RCA system (Tr. of Proc., pp. 21, 39, 323-4). The identity of these witnesses, the subject matter of their testimony, and whether the "improvements" were those covered by the Progress Report, or included improvements even after the Commission's Second Report, were not stated by appellants.

United States v. *Pierce Auto Lines*, 327 U. S. 515, 535; *Interstate Commerce Commission* v. *Jersey City*, 322 U. S. 503, 514-515. The rule in that on judicial review, the question whether the agency abused its discretion must be decided only on the administrative record and not on facts not adduced before the agency. *National Broadcasting Co.* v. *United States*, 319 U. S. 190, 227. This rule applies as well where the complaint is that the agency abused its discretion in allegedly refusing to consider new matter developed after the close of the administrative record. *Tagg Bros.* v. *United States*, 280 U. S. 420, 442-445; *National Broadcasting Co.* v. *United States*, 47 F. Supp. 940, 947 (S. D. N. Y.) affirmed, 319 U. S. 190; cf. *Acker* v. *United States*, 298 U. S. 426, 433-434.[3]

If the evidence which Emerson contends the court below was required to hear related to the "improvements" which were called to the Commission's attention in the Progress Report, it is plain that whether the Commission abused its discretion in its treatment of that report must necessarily be determined by reference to what was sought of the agency and what was presented to it. The question whether an agency abuses its discretion in respect of such a matter can be decided only on what was before the agency, and not on what was not submitted to it or on belated exegeses of what was. Cf. *Ripley* v. *United States*, 220 U. S. 491-496. For it is obvious enough that an agency cannot be charged with abusing its discretion in not giving sufficient weight to that which was not before it.

It is equally clear that evidence concerning alleged improvements not specified in the Progress Report or occur-

[3] The district court in *National Broadcasting Company* v. *United States*, 47 F. Supp. 940, 947 (S. D. N. Y.), affirmed, 319 U. S. 190, stated (per L. Hand, J.) "... if the evidence [sought to be adduced in the court] went to contradict or overthrow the findings, we could not bring it into hotchpot with the evidence taken by the Commission, without deciding the issues in the first instance ourselves. We have no such power; it would upset the whole underlying scheme of an expert commission, whose orders must stand or fall upon such evidence as it had before it. ... If an aggrieved party wishes to supplement that evidence he must apply to the Commission itself, § 405."

ring after the Commission's decision is not permissible for the same reason. Evidence of events taking place subsequent to an agency's decision and not even called to the agency's attention cannot be adduced to show that the agency abused its discretion in reaching its decision. In *Tagg Bros.* v. *United States*, 280 U. S. 420, 444-445, this Court, through Mr. Justice Brandeis said that "Where it is believed that" the administrative agency "erred in" its findings because "important evidence was not brought to [its] attention, the appropriate remedy is to apply for a rehearing before [it] or to institute new proceedings. [The administrative agency] has the power and the duty to modify [its] order, if new evidence warrants the change. Compare *Interstate Commerce Commission* v. *Union Pacific R. R. Co.*, 222 U. S. 541, 550." An administrative order of the type here involved, like the "rate order" involved in the *Tagg* case "is not *res judicata*", but "may be superseded by another". *Ibid.* And, indeed, this was explicitly recognized by the Commission in its Second Report (Pars. 16 and 17, R. 420): The Commission invited further experimentation looking toward improved systems and stated that ". . . when such an improvement does come along, the Commission cannot refuse to consider it merely because the owners of existing receivers might be compelled to spend additional money to continue receiving programs".

Whether the evidence which Emerson contends the court below should have heard instead of granting summary judgment related to the alleged improvements covered in the Progress Report or to later "improvements", the court below could not have heard such evidence without substituting its own judgment for that of the Commission and granting a trial *de novo*. To consider such evidence would have required the court to embark on an inquiry involving the comparative evaluation of the performance of the RCA system as "improved" on the one hand, and of RCA's "unimproved" performance during the hearings on the basis of which the Commission entered its findings and conclusions, on the other hand. Only by such an evaluation could

the court itself determine the issue which is identified by Emerson as the issue involved—whether the alleged improvements are of "trifling significance" or "substantial or revolutionary". For the word "improvement" is by definition a relative term. It must be weighed in the balance against what is stated to have been improved upon. An inquiry of this nature would constitute the very process of trial *de novo* and substitution of judgment which has been held by this Court to be an improper assumption of administrative authority. *Tagg Bros.* v. *United States, supra*; cf. *Acker* v. *United States*, 298 U. S. 426, 433-434; *National Broadcasting Co.* v. *United States*, 319 U. S. 190.

Respectfully submitted,

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March, 1951.

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Supreme Court of the United States

OCTOBER TERM, 1950.

No. 565.

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., RCA VICTOR DISTRIBUTING CORPORATION, *et al.*,

Appellants,

against

UNITED STATES OF AMERICA, FEDERAL COMMUNICATIONS COMMISSION, AND COLUMBIA BROADCASTING SYSTEM, INC.,

Appellees.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES FOR THE NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION.

MOTION FOR EXTENSION OF STAY.

March 23, 1951.

Supreme Court of the United States

OCTOBER TERM, 1950.

No. 565.

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., RCA VICTOR DISTRIBUTING CORPORATION, *et al.*,

Appellants,

against

UNITED STATES OF AMERICA, FEDERAL COMMUNICATIONS COMMISSION, and COLUMBIA BROADCASTING SYSTEM, INC.,

Appellees.

Appeal from the District Court of the United States for the Northern District of Illinois, Eastern Division.

MOTION FOR EXTENSION OF STAY.

Appellants respectfully move that the Court enter an order extending until further order of the Court the stay granted by the District Court until April 1, 1951, or until terminated by this Court, against the order of the Federal Communications Commission (herein called the Commission) here involved, in order to preserve the *status quo* on appeal.

1. This temporary restraining order and the findings of fact and conclusions of law which were entered by the District Court are attached hereto as Appendix A.

2. In unanimously entering its temporary restraining order, the court below stated:

> "Thus concluding that the matter of a further stay of the Commission's order is discretionary, we shall state some of the reasons which move us to preserve the status quo. Of the nine million black and white television receivers in the hands of the public, there are none capable of receiving a picture either in color or black and white, broadcast under the proposed standards. In order to receive a black and white picture, it is necessary that a receiver be equipped with an adapter estimated to cost $50.00, plus the expense of installation. In other words, it would cost the American public nearly one-half billion dollars to equip existing sets to receive, under the proposed system, black and white pictures, and even then admittedly they would be of a grade inferior to present black and white pictures. In addition, in order to receive a picture in color, it will be necessary to add to an existing receiver a converter, estimated to cost about $100.00, plus the expense of installation. Thus, this will cost the public nearly one billion dollars. In other words, upon an expenditure by the public of one and one-half billion dollars, adapters and converters can be added to existing receivers so as to receive, under the proposed system, pictures in black and white and in color.
>
> "But this is only a part of the story insofar as it relates to the public. It was here stated in oral argument and not disputed that there are no adapters or converters on the market and that manufacturers would require a period of from six to eight months before they could be made available. So it seems

reasonable to conclude that if the instant order was now in effect, there would be no broadcasting under the proposed standards for many months, for the simple reason that there would be no sets capable of receiving such programs. And it does not square with common sense to think that manufacturers would rush into the business either of manufacturing adapters and converters for existing sets or manufacturing sets with built-in adapters and converters while this controversy is pending. And to maintain that the public in any considerable number would purchase adapters and converters, assuming they were available, under the existing state of doubt and uncertainty, is to cast a reflection on the intelligence of people.

• • • • • •

"Another reason why this order should be stayed is the existing economic situation, recognized by Commissioner Sterling in his dissenting opinion, wherein he stated, 'The problems confronting manufacturers today in terms of production, procurement and manpower to meet the demands of national defense are serious ones. • • • It is well known that there are serious shortages of tubes and resistors as well as basic materials. • • • Moreover, in many instances industry has been required to divert its TV engineering experts to problems of production for defense because of the close relationship of TV techniques to radar and other electronic devices the government requires.' It is a matter of common knowledge that the situation thus described becomes more acute with each passing day, and the prospects are that it will be far worse before it is better. It is hardly conceivable that either the Commission or the government would under such circumstances desire, much less insist, that the order in controversy be made effective" (R. 876-78).

3. Extension of the stay is required in the public interest to maintain the *status quo* pending the decision by this Court on this appeal.

Respectfully submitted,

JOHN T. CAHILL,
Counsel for Appellants,
Radio Corporation of America, National Broadcasting Company, Inc., and RCA Victor Distributing Corporation.

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B. C. SCHIFF,
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JOHN J. KELLY, JR.,
Counsel for Intervener-Appellant,
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FRANK S. RIGHEIMER, JR.,
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CARL POMERANCE,
Counsel for Intervener-Appellant,
Sightmaster Corporation.

ALFRED KAMIN,
Counsel for Intervener-Appellant,
Local 1031, International Brotherhood of Electrical Workers, AFL.

GERALD RATNER,
Counsel for Intervener-Appellant,
Television Installation Service Association.

March 23, 1951

Appendix A.

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION

No. 50 C 1459

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., AND RCA VICTOR DISTRIBUTING CORPORATION, *Plaintiffs*,

vs.

UNITED STATES OF AMERICA AND FEDERAL COMMUNICATIONS COMMISSION, *Defendants*

Order.

This cause having come on to be heard on plaintiffs' motion for interlocutory injunction and for a temporary restraining order, and on defendants' motion for summary judgment and to dismiss the Complaint, and the Court having heard the arguments of counsel and having considered the briefs filed herein, and the Court being fully advised in the premises,

It is hereby ordered that the temporary restraining Order entered November 16, 1950 restraining and suspending the promulgation, operation and execution of the Order of the Commission of October 10, 1950, be and it hereby is continued in full force and effect until April 1, 1951, or until terminated by the Supreme Court of the United States, and the findings of fact and conclusions of law heretofore made in support of said temporary restraining order are hereby re-adopted.

It is further ordered that a summary judgment be and it hereby is entered in favor of the defendants and against the plaintiffs and the complaint is dismissed.

J. EARL MAJOR,
Judge, United States Court of Appeals, Seventh Circuit.

PHILIP L. SULLIVAN,
Judge, United States District Court.

Dissenting:

WALTER J. LABUY,
Judge, United States District Court.

IN THE DISTRICT COURT OF THE UNITED STATES FOR THE NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION

Civil Action No. 50 C 1459

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., AND RCA VICTOR DISTRIBUTING CORPORATION, *Plaintiffs*,

against

UNITED STATES OF AMERICA AND FEDERAL COMMUNICATIONS COMMISSION, *Defendants*

Findings of Fact and Conclusions of Law.

This cause coming on to be heard on the 14th and 15th days of November, 1950, upon a motion of plaintiffs for an interlocutory injunction, and for a temporary restraining order from and after November 20, 1950 in the event the motion for an interlocutory injunction is not determined by that date, which motion has been adopted and joined in by interveners Emerson Radio & Phonograph Corporation, Pilot Radio Corporation, Wells-Gardner & Co., Sightmaster Corporation, The Radio Craftsmen Incorporated, Television Installation Service Association, and Local 1031, International Brotherhood of Electrical Workers, AFL, and upon motions by defendants and the intervener, Columbia Broadcasting System, Inc. to dismiss the Complaint, or in the alternative for summary judgment, before the Honorable J. Earl Major, Chief Judge of the United States Court of Appeals, Seventh Circuit, and the Honorable Philip L. Sullivan and Walter J. LaBuy, Judges of the District Court of the United States for the Northern District of Illinois, Eastern Division, and upon all pleadings,

affidavits and documents filed by the parties and upon consideration thereof and of the arguments of counsel for the respective parties, the Court, being advised in the premises, hereby makes the following Findings of Fact and Conclusions of Law:

Findings of Fact.

1. The Federal Communications Commission (hereinafter called the Commission) on October 10, 1950 adopted an Order amending the Commission's "Standards of Good Engineering Practice Concerning Television Broadcast Stations". The order adopted the color television system of the intervener, Columbia Broadcasting System, Inc., and precludes the transmission of the color television system proposed by plaintiff Radio Corporation of America and of all other proposed systems other than the one adopted.

2. The Order, to become effective on November 20, 1950, provides for the commercial broadcasting of color television on standards which are different from the existing standards for the commercial broadcasting of black and white television, which have been in effect since 1941.

3. There are now in the hands of the public approximately 9,000,000 black and white television receivers, none of which can receive any programs broadcast in accordance with the new standards promulgated by the Order.

4. To protect the service which they have been getting, the owners of these 9,000,000 black and white television receivers would have to spend millions of dollars in order to adapt their sets to receive programs broadcast on the new standards.

5. After such adaptation, programs broadcast under the new standards would be received only as a black and white picture having less than one-half the picture detail of the existing black and white service.

6. For the public to both adapt and convert the existing 9,000,000 television receivers so that they would receive in color the programs broadcast in accordance with the new standards would cost many more millions of dollars.

7. Plaintiffs, on October 17, 1950, brought this action to enjoin, set aside, annul and suspend the Commission's Order of October 10, 1950.

8. Plaintiffs have moved for an interlocutory injunction to restrain and suspend the promulgation, operation and execution of the Order, and for a temporary restraining order from and after November 20, 1950, in the event the motion for an interlocutory injunction is not determined by that date.

9. The pending action in which this motion is made has been brought pursuant to the provisions of Section 402(a) of the Communications Act of 1934, as amended (47 U.S.C. Sec. 402(a) and of Title 28, United States Code (28 U.S.C. Secs. 1336, 1398, 2284, 2321-25), and of Section 10 of the Administrative Procedure Act (60 Stat. 243; 5 U.S.C. Sec. 1009), providing for the judicial review of orders of the Commission of the kind here involved, and for the issuance of temporary relief against injury caused thereby.

10. Plaintiffs' motion for an interlocutory injunction and for a temporary restraining order has been adopted and joined in all by all parties who have intervened seeking to vacate, set aside, suspend and annul the Commission's Order of October 10, 1950.

11. The Court, while having been advised in the premises, has not had sufficient time to consider fully the issues raised by the verified complaints and the affidavits filed by the parties prior to November 20, 1950, the effective date of the Commission's Order.

12. The plaintiffs and interveners, representing manufacturers, employees, a distributor, a television broad-

caster, a proponent of a color television system, set owners and television servicemen will suffer irreparable damage if the Commission's Order is not restrained or suspended during the consideration and determination of the motion for an interlocutory injunction, by virtue of the impairment of the market acceptance of present television receivers and by virtue of the inability of present television receivers to receive any broadcast on the standards adopted by the Order without substantial expenditures which may prove to be useless. The foregoing is shown by: the affidavits of C. B. Jolliffe, sworn to on November 8, 1950; Walter A. Buck, sworn to on November 8, 1950; John H. McDonald, sworn to on November 8, 1950; Walter M. Norton, sworn to on November 9, 1950; Richard L. Hirsch, sworn to on November 13, 1950; Harold V. Levin, sworn to on November 13, 1950; and J. O. Reinecke, sworn to on November 13, 1950; the verified Complaints of Emerson Radio & Phonograph Corporation, Wells-Gardner & Co., The Radio Craftsmen Incorporated, Television Installation Service Association, and Local 1031, International Brotherhood of Electrical Workers, AFL; and all other affidavits submitted in this action.

13. The temporary suspension of the aforesaid Order of the Federal Communications Commission pending a determination of the aforesaid motion for an interlocutory injunction will be in the public interest.

Conclusion of Law.

Plaintiffs' motion for a temporary restraining order restraining and suspending until further order of this Court the promulgation, operation and execution of the Order

of the Federal Communications Commission adopted October 10, 1950, effective November 20, 1950, should be granted.

Enter:

J. EARL MAJOR,
Judge of the United States Court of Appeals, Seventh Circuit;

PHILIP L. SULLIVAN,
Judge of the United States District Court;

WALTER J. LA BUY,
Judge of the United States District Court.

Dated: Nov. 16, 1950.

IN THE DISTRICT COURT OF THE UNITED STATES FOR THE NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION

Civil Action No. 50 C 1459

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC.

and

RCA VICTOR DISTRIBUTING CORPORATION, *Plaintiffs*

against

UNITED STATES OF AMERICA and FEDERAL COMMUNICATIONS COMMISSION, *Defendants*

Temporary Restraining Order.

Plaintiffs' motion for an interlocutory injunction and for a temporary restraining order from and after November 20, 1950 in the event the motion for an interlocutory injunction is not determined by that date, which motion has been adopted and joined in by interveners Emerson Radio & Phonograph Corporation, Pilot Radio Corporation, Wells-Gardner & Co., Sightmaster Corporation, The Radio Craftsmen Incorporated, Television Installation Service Association, and Local 1031, International Brotherhood of Electrical Workers, AFL, and defendants' and intervener's (Columbia Broadcasting System, Inc.) motions to dismiss the Complaint, or in the alternative for summary judgment, having come on for hearing before the Court, and the Court not having had sufficient time to consider fully the issues raised and the verified complaints and affidavits filed by the parties, and having determined that irrepa-

rable damage will result if the promulgation, operation and execution of the Order of the Federal Communications Commission adopted October 10, 1950, is not restrained and suspended pending determination of the motion for an interlocutory injunction and the aforesaid motions to dismiss the Complaint, or in the alternative for summary judgment, and the Court having made its Findings of Fact and Conclusions of Law to such effect, it is hereby

Ordered that the motion for a temporary restraining order, restraining and suspending until further order of this Court the promulgation, operation and execution of the Order of the Federal Communications Commission adopted October 10, 1950, effective November 20, 1950, be and it hereby is granted; and it is further

Ordered that the promulgation, operation and execution of the aforesaid Order of October 10, 1950 be and the same hereby is restrained and suspended pending the further order of this Court.

Enter:

J. EARL MAJOR,
Judge of the United States Court of Appeals, Seventh Circuit;

PHILIP L. SULLIVAN,
Judge of the United States District Court;

WALTER J. LABUY,
Judge of the United States District Court.

Dated: November 16, 1950.

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Supreme Court of the United States

OCTOBER TERM, 1950.

No. 565.

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., RCA VICTOR DISTRIBUTING CORPORATION, *et al.*,

Appellants,

against

UNITED STATES OF AMERICA, FEDERAL COMMUNICATIONS COMMISSION, AND COLUMBIA BROADCASTING SYSTEM, INC.,

Appellees.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES FOR THE NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION.

MOTION FOR LEAVE TO DISPENSE WITH PRINTING PART OF THE RECORD.

JOHN T. CAHILL,
Counsel for Appellants,
Radio Corporation of America, National Broadcasting Company, Inc., RCA Victor Distributing Corporation.

PHILIP B. PERLMAN,
Solicitor General,
BENEDICT P. COTTONE,
General Counsel,
Federal Communications Commission.

March 2, 1951.

Supreme Court of the United States

OCTOBER TERM, 1950.

No. 565.

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING COMPANY, INC., RCA VICTOR DISTRIBUTING CORPORATION, *et al.*,

Appellants,

against

UNITED STATES OF AMERICA, FEDERAL COMMUNICATIONS COMMISSION, and COLUMBIA BROADCASTING SYSTEM, INC.,

Appellees.

Appeal from the District Court of the United States for the Northern District of Illinois, Eastern Division.

MOTION FOR LEAVE TO DISPENSE WITH PRINTING PART OF THE RECORD

Appellants Radio Corporation of America, National Broadcasting Company, Inc., and RCA Victor Distributing Corporation, and appellees United States of America and Federal Communications Commission respectfully move that the Court grant leave to dispense with the printing of the record of the proceedings before the Federal Communications Commission involved in this appeal, in accordance with the stipulation of the parties to the appeal.

1. In order to expedite the hearing of this appeal before this Court, and in order that the appeal may be heard this Term, all the parties to the appeal (including those not parties to this motion) have executed a stipulation dispensing with the printing of certain parts of the record. Included in the parts of the record which the parties have agreed not to print is the record of the proceedings before the Federal Communications Commission involved in this appeal. Thus, the stipulation reads in part as follows:

> "The parties to the above entitled cause hereby stipulate that the following parts of the record should be printed by the Clerk of the Supreme Court:
>
> "The entire record on appeal, except:
>
> "(a) Record of proceedings before the Federal Communications Commission, Index thereto and Certificate of the Secretary of the Commission, attached as Appendix A to the affidavit of Benedict P. Cottone, filed October 30, 1950 (Praecipe, Item 6).
>
> • • • • • •
>
> "The parties to the above entitled cause hereby further stipulate that those parts of the record which are not printed may be referred to by any of the parties in their briefs as though they had been printed, and they further stipulate that such proceedings before the Federal Communications Commission as are incorporated by reference in the record of proceedings attached as Appendix A to the affidavit of Benedict P. Cottone filed October 30, 1950 in the District Court may also be referred to in the same manner."

2. Paragraph 9 of Rule 13 of the Revised Rules of the Court reads in part as follows:

> "If at the hearing it shall appear that any material part of the record has not been printed, the

appeal may be dismissed or such other order made as the circumstances may appear to the court to require."

3. The record before the Federal Communications Commission is over 9,000 pages in length, exclusive of 256 exhibits, many of which are lengthy. The Office of the Clerk of this Court has advised the undersigned that printing the record of the proceedings before the Federal Communications Commission involved in this appeal would take over two months and that if this part of the record is to be printed the appeal cannot be heard this Term.

4. In *National Broadcasting Company* v. *United States*, 316 U. S. 447 (1942), and in *National Broadcasting Company* v. *United States*, 319 U. S. 190 (1943), the record of the administrative hearing before the Federal Communications Commission there involved was filed in this Court as an original exhibit and was not printed. Thus, the Government's brief before this Court in the latter case states in a footnote on page 13 as follows:

> "The record before the Commission was filed with the court below in support of the Government's motions to dismiss the complaint or in the alternative for summary judgment; and also in opposition to appellants' motions for preliminary injunction (NBC R. 263, 392; CBS R. 355, 473). This record has been certified to this Court as an original exhibit. It has not been printed, but the parties have stipulated that it may be referred to in the briefs (NBC R. 546-547; CBS R. 506). It is referred to hereafter as 'Tr.' ".

5. A certified copy of the record of the proceedings before the Federal Communications Commission involved in this appeal is filed in the Office of the Clerk of this Court.

6. The undersigned respectfully move the Court to grant leave to dispense with the printing of the record of the proceedings before the Federal Communications Commission involved in this appeal, in accordance with the stipulation of the parties to the appeal.

Respectfully submitted,

JOHN T. CAHILL,
Counsel for Appellants,
Radio Corporation of America, National Broadcasting Company, Inc., RCA Victor Distributing Corporation;

PHILIP B. PERLMAN,
Solicitor General;

BENEDICT P. COTTONE,
General Counsel,
Federal Communications Commission.

March 2, 1951.